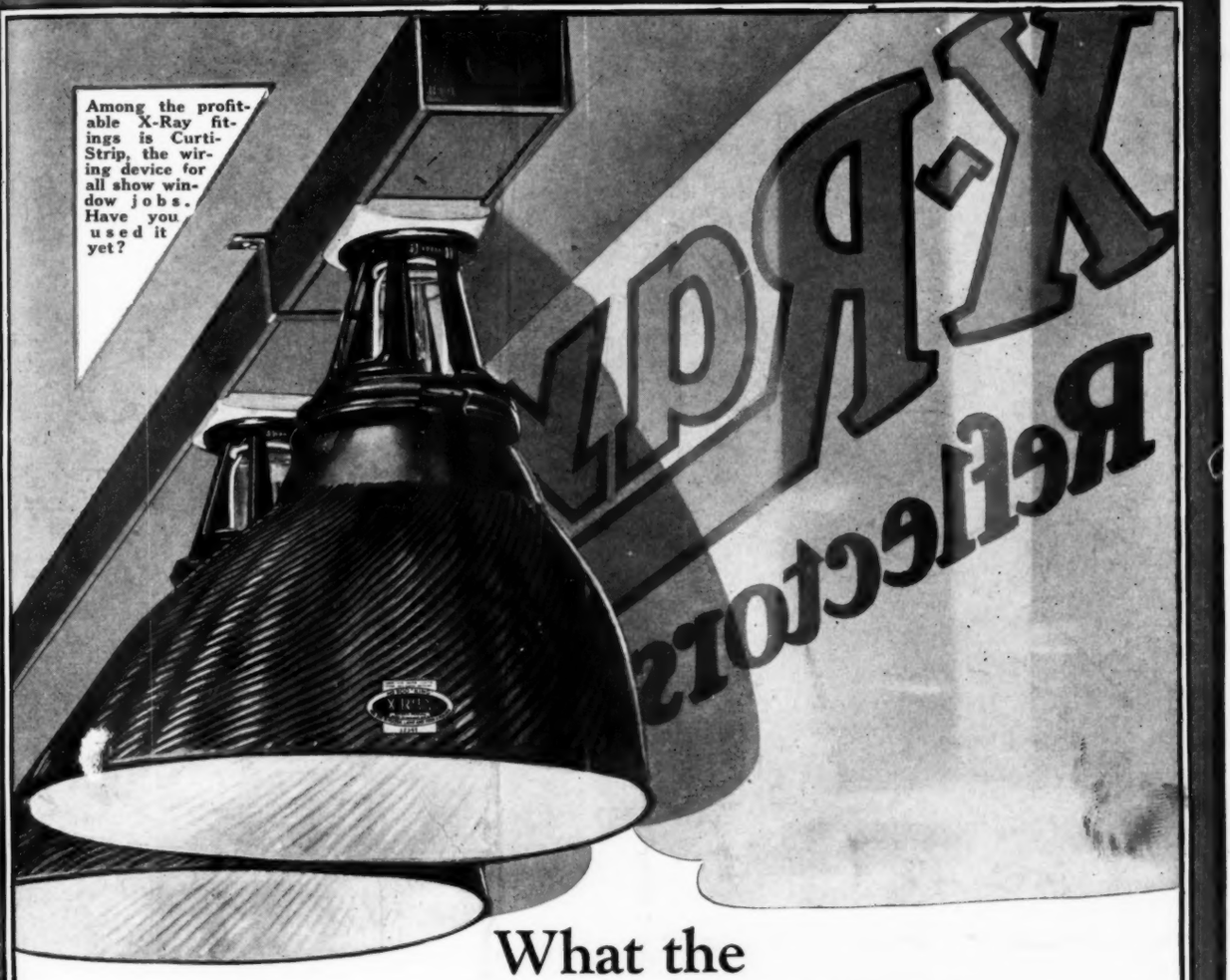
The Electragist

TRADE MARK REG. U.S. PAT. OFFICE

Vol. 27, No. 9 — Association of Electragists INTERNATIONAL — JULY, 1928


Among the profitable X-Ray fittings is Curti-Strip, the wiring device for all show window jobs. Have you used it yet?
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What the Well Dressed Window Will Wear

Just think—that store window being remodeled just around the corner from you—the show windows of the big office building going up in the center of town—and the windows in that row of shops out in the newly developed section—the majority of these will have modern X-Ray lighting.

If you make a little effort to get it, the business is yours.

To help you in every possible way to sell more and more X-Ray Reflectors, competent illuminating engineers in all principal cities are always ready to find prospects, plan your window layouts, and help you bring back the jobs.

If you want to know how we can help you still further, write today to

CURTIS LIGHTING, Inc.

1119 W. Jackson Boulevard, Chicago, U. S. A.

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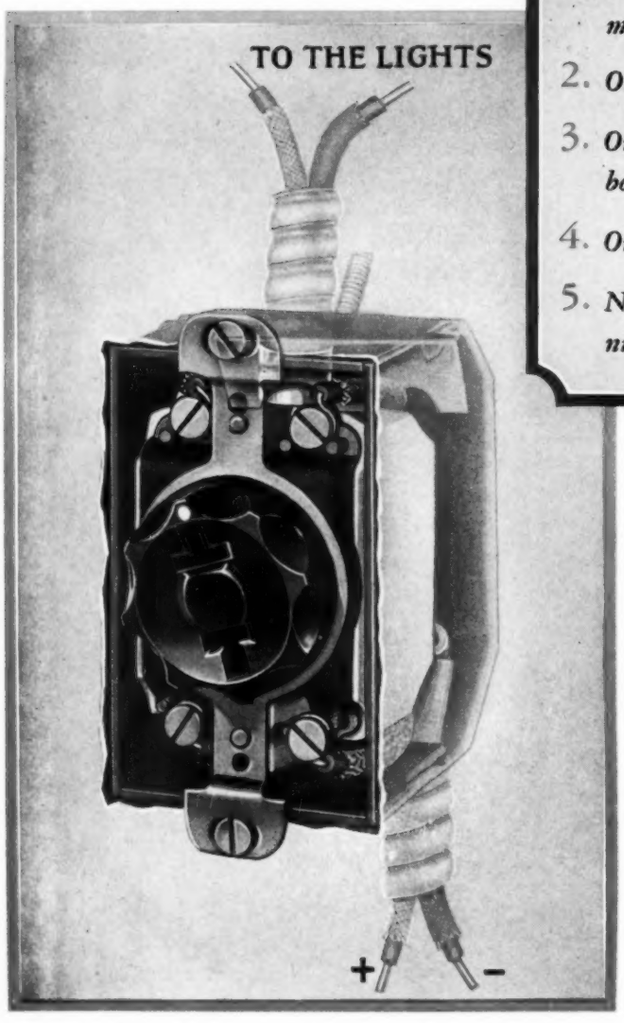
Two *in* One

The Switch is the Outlet-the Outlet is the Switch



1. *Only one device to mount and wire.*
2. *Only one BX required.*
3. *Only one* single *outlet box.*
4. *Only one* single *plate.*
5. *No looping—less skinning—less wire.*

Simplifies the Wiring Job

RUN one BX—wire one device—snap on a Hubbell Screwless Plate of any color desired—and the job is done!

You've got a switch for the lights—and a handy Te-Slot outlet for appliances—"Two in One"!

A quarter turn of the "finger-grooved" Switch-Tap outlet—and the lights are on or off as desired Outlet is always alive.

Install Hubbell "Switch-Taps"—save time, labor and material. Every "Switch-Tap" installation means more profit—and a pleased customer.

Mail the coupon now for complete information

HARVEY HUBBELL, INC.
BRIDGEPORT, CONNECTICUT

HUBBELL *Switch-Taps*

Mail coupon to our nearest office
Bridgeport, Conn., Main Office

Boston, Mass.
176 Federal St.

Atlanta, Georgia
138 Marietta St.
H C. Biglin

Baltimore, Md.
216 E. Lexington St.

New York City, N. Y.
30 East 42nd St.

Chicago, Illinois
318 W. Washington St.

Denver, Colo.
1109 Broadway
The Sales Service Co.

Philadelphia, Pa.
Fifth St.—
Philadelphia Bourse
(Exhibition Dept.)

San Francisco, Cal.
390 Fourth St.
Garnett Young & Co.

Please send information on Hubbell "Switch-Tap"

Name_____

Address_____

City and State_____

E. 7-28.

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The Electragist

(The National Electrical Contractor and The Electrical Contractor-Dealer)

Official Journal of the Association of Electragists—International

Vol. 27 JULY, 1928 No. 9

Outbursts, Suggestions, Criticism

To the Editor

Written by the Readers

Salesmen

ARE contractors salesmen? Can they sell an adequate wiring job, or is the N. E. L. A. right when it says lack of confidence in the responsibility of the electrical contractor is one of the reasons why people are not buying adequate wiring? One contributor's idea is given below. What do YOU think? The editor will be glad to have your opinion.

Better Wiring Salesmen

Who is better fitted to sell adequate wiring—the contractor or the lighting company? I think the N. E. L. A. wiring committee is dead wrong when it says that lack of confidence in the responsibility of the electrical contractor is one of the reasons why the public is not buying adequate wiring. My own experience as a small contractor disproves that. I have been in business just a little over a year and in that time I have been able to talk a few of my customers into having a good job with plenty of outlets and I can show these jobs as proof of this statement. If a young fellow of my age (23 years) can go out and talk business with some of these hard boiled builders and convince them that they should have a real good job, then, tell me, why can't our older and more experienced contractors do the same thing? I'm sure that they can do it if they would only open their eyes. I think better times for contractors are just around the corner.

There is only one way of improving our business and that is for us contractors to get the progressive spirit. Most contractors that I have met are more or less pessimistic in their speech and actions. They think the ship is on the rocks and that there is no more hope. I think that if we organized the contractors in the big cities first and sold the better wiring idea to them the rest of the country would follow us. For instance, I have heard several contractors say that they would like to be in the business in California. They said this simply because they had been hearing a lot about what the local associations out there were doing. We've got to get all the contractors thinking alike.

Fred Meyer, Jr.,
Electragist,
New York City.

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Praise for Code Analysis

Congratulations on the good work you are doing in giving publicity to the changes in the National Electrical Code. I know of no better way to become conversant with the 1928 Code than by perusal of THE ELECTRAGIST.

Robert M. Nesbitt, Chief,
Electrical Department Fire Underwriters.

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The Ceiling Fixture

I was considerably interested in reading the editorial in your May issue on "The Ceiling Fixture." It was especially interesting because of the fact that a number of Red Seal licenses are attempting to force the use of the ceiling fixture by making it a requirement of their Red Seal specifications.

In Kansas City we found a decided drift away from the ceiling fixture, particularly in living rooms, as mentioned in your editorial. We believe that adequately wired homes should be entitled to Red Seal if a certain number of brackets are used in place of the ceiling fixture and so we permit a choice between the two. We are pushing adequate wiring and not a particular type of illumination. There certainly is a distinction.

Personally, I like ceiling fixtures, but believe the tendency will continue to be away from the use of them unless the fixture industry utilizes the inventive genius that it must possess to bring out something different than the line of ceiling fixtures which the public apparently does not care to use as much as we think they should.

Only today, in our Red Seal work, we had to unsell a woman who wanted to use wall brackets in the dining room instead of a ceiling fixture. She had been reading in some woman's magazine one of those fancy articles written by some so-called authority who evidently was striving to suggest something different. Another recent case con-

cerned a woman who would not have any lighting fixture at all in a sun room. She was building a very beautiful and expensive home and it was exceptionally well wired, but we had to refuse a Red Seal certificate because of the fact that all she had in the sun room were five convenience outlets and a radio outlet. Not even a switch.

I have noticed somewhat of a tendency to cut down on the number of bracket outlets. This leads me to think that the fixture industry should begin to get down to brass tacks on some real designing and cooperative business-building efforts or they are apt to wake up, facing a real shrinkage in the volume of their business. I can already see a trend towards the use of more convenience outlets and portable lamps and less ceiling fixtures and bracket fixtures.

New designs alone will not, in my opinion, correct this tendency. I believe that there must come a national educational effort, stressing proper lighting which, of course, resolves itself into the question of enough light, placed where it is needed and properly shaded. My observation indicates that most of the many wall brackets in use contain unshaded lamp bulbs. And the eye conservation council tells us that about 25 per cent of our school children have defective vision. There are a number of splendid arguments that can be used along this line to further the suggestion of shaded lights in homes. I believe that such an industry effort would not only result in a revival of the fixture business and everything that goes with it, but would also stimulate the consumption of electricity—and, certainly, the central stations are interested in this.

G. M. Weston, Secretary, Kansas City Electric Club.

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Hall Light Wiring Plan

Please send me a wiring diagram of a hall lighting scheme whereby a light in the upstairs hall can be lighted or extinguished from either location simultaneously. The light downstairs in the hall should be extinguishable from the upstairs while upstairs light remains burning; or vice versa.

Ovide C. Harris, New Orleans, La.

Answer: I do not think it is possible for you to control lights in the manner stated in your letter by means of a single switch at each location, that is, one on the first floor and one on the second floor. To obtain the desired control by means of a single switch at each point you would require a three-position switch so that in the first position both lights would be burning, in the second position one light only would burn and in the third position both would be extinguished. For the control of lights from two or more points the only standard switches available are the three-point and four-point, and both of these are two-position switches. As far as I can see the only solution of your problem would be to install two sets of three-point switches, one set to control each light. What is the objection to this method of control?

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Education Cuts Competition

I am not in entire agreement with those who say it is useless to try to educate the electrical contractor. In the majority of cases they may be right but fortunately in the electrical game only a small proportion of the aggregate electrical wiring is done by this class of non-progressive contractors.

Some of our members favor the educating of contractors, especially when they are in direct competition with them because they feel they would rather bid against an intelligent competitor than one who does not know his business. On the other hand, there are some other members who feel that educational work merely raises the stages of some contractors and immediately increases competition in their class of work. This latter attitude, as you will no doubt agree, is purely a selfish one.

Samuel S. Vineberg, Manager-Secretary, Electrical League, Niagara Frontier.

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Job Management

I have read with interest the article in the April issue of THE ELECTRAGIST written by Mr. Goeller. While the matter of job management pertains to jobs of all sizes, I believe that it really means more and needs more intensive study on the larger class of construction. The average job in the average city does not need the same type of supervision when it comes to devising new methods of efficiency that the large job requires.

The big problem facing the contracting industry as I gathered from my trip across the continent, is the tendency to see how close to cost a job can be given to the owner. I found the same conditions existing in every community; not how much overhead and profit should be added to the cost of the job, but how close to actual cost of labor and material can one go and still stay in the business. In all my years' experience in the electrical business I have never seen it so demoralized as it is today. This is true not alone of the electrical business but of the whole building industry and until there is a cleaning out of the over-supply of contractors in the building industry this condition will continue to exist. The only bright spots in the country are those large industrial centers where through efficient management contractors are enabled to get their costs down to a place where they can get the business and still make money.

Clyde L. Chamblin, President, Association of Electragists.

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Standard Materials

I am doing some specification work among the architects and contractors throughout the states of Texas and Oklahoma, and I am just wondering if you had some typical paragraphs suitable for me to use in lining up architects and contractors to use standard materials, especially on industrial work, in wiring for motors and the proper lighting for small industrial plants.

H. L. Davis, Southwest G. E. Supply Co., Dallas, Texas.

Answer: I understand that what you want is a paragraph which can be inserted in any specification to call for the use of approved standard materials throughout. Below I give two paragraphs which you may find suitable for this purpose. The first one covers everything in the electrical line which is inspected by the Underwriters' Laboratories and therefore I believe covers the ground as fully as it is possible to do. I have given considerable thought to the working of this paragraph and while it is short I believe it is air tight and does not require further explanation or qualification. Lighting equipment, outside of complete fixtures and sockets, is not inspected by the laboratories and I do not know of any standard for this class of equipment, except the R. L. M. reflectors. It is a matter of considerable importance to supply architects, engineers and contractors with such paragraphs as these to be inserted in specifications. I suggest these:

"All materials and apparatus installed under these specifications, except such classes of materials and apparatus as are not regularly inspected by the Underwriters' Laboratories, shall be of types and makes included in the latest edition of the "List of Inspected Electrical Appliances" or in the lists supplementary thereto, published by the Underwriters' Laboratories."

"Except as otherwise specified, all lamps shall be equipped with porcelain enamelled steel reflectors of sizes designed for the lamps with which they are to be used and of the type known to the trade as R. L. M. Reflectors", conforming to the Reflector and Lamp Manufacturers' Standards."

Utilities Must Build Sound Trade Relations*

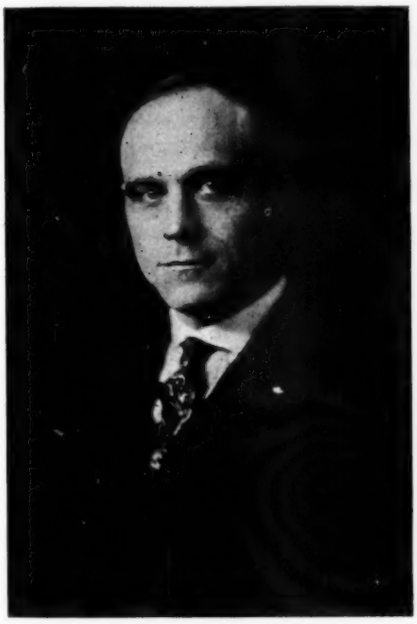
By CLYDE L. CHAMBLIN,
President, Association of Electragists, International

MAY I ask of you officials of the central station branch what more can we do to awaken the consciousness of the contractor-dealer branch to its responsibilities than we are and have been doing with the means at our command?

For the most part, we are dealing with individualists, men whose profit or loss come from their immediate pockets. As parts of great, financially strong, corporations, it takes real effort on your part to get the point of view, and understand the problems of the contractor-dealer. You are vitally interested, of course, in the menace of government interference in your business, but you are interested and concerned en masse, rather than as individuals. On the other hand, the contractor-dealer is hit individually and immediately, when a central station, or any other outside influence, adopts policies detrimental to his local business.

Of necessity he thinks and weighs everything pertaining to the electrical business in terms of the personal pronoun "I," while you think of it in terms of "we," or the power business as a whole. He is thinking of the overhead and profit in the individual sale of his job or merchandise; you are thinking of the continuing profit from the load the job or merchandise will put on the line. *He* has to weigh carefully how far he can afford to contribute in time or money to general industry cooperative movements, for he gets only a percentage of the tangible returns for such efforts. *You* cannot understand his apparent indifference and apathy, for you as a monopoly in each community are sure of a return on every industry development movement. You are thinking in terms of increased salaries and titles as a reward for K. W. H. increase; he is thinking in terms of profit or loss caused by sales methods with which he cannot compete, and the competition of ignorant, fly-by-night competitors.

The wonder to me is that we find as many contractor-dealers as we do willing to give of their time and money for every movement for industry betterment, when their very existence is contingent on being able to match the wits of the owner, architect, general contractor, manufacturer, jobber, central station and competitors. None is so blind as him who will not see, and when we see men in high places, unwilling to take the time or make the effort to really go into the problems of this firing line of the industry, it is a wonder to me how they have attained to these high places. As has been so often said it is an industry problem, and again I ask, "What more can the officers of the A. E. I. do than they are doing to better the condition of this branch with the funds and man power available at their command?"



Clyde L. Chamblin

If the World War has taught the nations that conference instead of conflict is the thing to be desired in the handling of international problems, why should we not apply the same reasoning to inter-industry problems? Unfortunately, however, there are sections of the country, and groups of individuals, who, either through ignorance or deliberate intent, are unwilling to give any consideration to bringing about conditions under which a contractor-dealer can successfully conduct his business.

The very fact that such large numbers of contractor-dealers are not conducting a successful and growing business proves that something is wrong in the business possibilities of this branch. If there are substantial possibilities of success in any field, men with ability and finances will be attracted to that field, and will eventually crowd out the inexperienced and under-financed. Why then, are not more men of this type being attracted to the retail end of this great industry? It is because conditions are not right.

Instead of investigating this question in a businesslike way and finding out what elements are necessary to build up a creditable electrical business, we continually have flaunted in our faces the inane expression, "The cost of wiring is too high," and "the contractor-dealer is not capable of doing a selling job." No power company man who ever used this expression would dare risk his capital in a contractor-dealer business.

As long as such an atmosphere prevails, there will be a widening breach growing up between the two branches. The surest way to wreck an organization is to have dissension from within, and I believe we are facing a very critical period. The exploitation of the contractor-dealer to the advantage of the larger branches cannot continue, and if your leaders and men of vision do not take steps to correct this condition, the possibility of a united market development program is out of the question.

The central stations of the country are spending vast sums to foster public good will. If they would take a half of this money and spend it in building up industry good will, I will venture the assertion it would return them a hundred fold more in actual K. W. H. increases than their present method. If the relationship of the power companies is not right within the industry in any

(*Continued on Page* 27)

* Abstract from address before Pacific Coast Electrical Association, Pasadena, Calif., June 15, 1928.

Frequent Follow-Up Aids Collections

An Efficient Method of Recording Accounts Makes It Easy to Follow-up Regularly

"FOLLOW-UP" is the slogan of the Newbery Electric Corporation, Los Angeles, Calif., which collects 99 1-2 percent of its accounts (including many charge and installment accounts). The success of the collection program according to H. R. Burdick lies in the fact that a reliable and accurate record of every account is kept in such a form that it is automatically brought up for follow-up if it is not paid promptly. The collection efforts themselves are inexpensive, but effective.

The record system used by the Newbery Electric Corporation includes a set of large index cards, 8 inches long by 5 inches wide, one of which is filled in for each customer, whether C. O. D., charge, installment, or progressive payment contracting customer. At the top of the card is a tab which can be set at the day when the next follow-up must be made. Follow-up statements are sent every seven days, and telephone calls are made weekly also, if necessary.

The index card has spaces for a complete record of the customer, including business connections, references, credit rating as given in the national and local rating books, credit limit set by the credit manager of the Newbery Company, and a complete history of the account. Under the head of "Remarks" such information as the following is given:

"Location of job, general contractor, amount of contract, nature of building, date completed, bonding company, nature of bonds, mortgages, encumbrances, legal description, architect, last delivery date, notice of completion filling date, lien foreclosing date, attorney, date of trial, lien released, owner's name, search number, high credit, owing, past due, etc."

The first invoice is mailed on the first of the month following the purchase, or immediately after completion of the job. A discount of 2 percent is offered for materials, none for contracting labor. If the account is not paid within 30 days, the follow-up system begins.

The first invoice gives full information about items purchased, amounts charged, amounts credited, and balance due; follow-up statements give only the amount due, and may include a phrase typed on the body such as "Now due for payment," or "Settlement will oblige." These statements are sent each week and as the billing clerk makes out the statement from the record card she moves the tab to the date a week distant when the next follow-up is to be made. Thus the account automatically comes up for further consideration seven days later.

STATEMENT

NEWBERY ELECTRIC CORPORATION
726 SOUTH OLIVE ST.
Los Angeles, Cal.

Phone
TRinity 2914

TEAR OFF AND RETURN THIS STUB WITH YOUR CHECK
CANCELLED BANK CHECK IS YOUR RECEIPT

DATE	REFERENCE NO.	ITEMS	CHARGES	CREDITS	BALANCE

This statement is a complete record of your account for the month—it shows what you paid as well as what you purchased and returned.

The final balance on last month's statement is brought forward at the beginning of this statement. All purchases are shown in the Charges Column. All merchandise returns and all cash paid are shown in the Credits Column.

NEWBERY ELECTRIC CORPORATION

PAY LAST AMOUNT IN BALANCE COLUMN

The Statement

1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31					
NAME IN FULL — SUR NAME FIRST — WIFE'S NAME			OCCUPATION OR PROFESSION		NATIONALITY
HOME ADDRESS — STREET AND CITY — RES. PHONE			EMPLOYED BY		HOW LONG
NEAR OR BETWEEN WHAT STS. — OWN OR RENT			BUSINESS ADDRESS		BUSINESS PHONE
DATE ANY CHANGE OF ADDRESS — ORDER NUMBER			BUSINESS, PERSONAL OR BANK REFERENCE		
DATE MAIL ADDRESS — SALESMAN			DUN	BRAD.	FIDELITY — WILBER
ACCT. NO. — TERMS — C. O. D.			CREDIT LIMIT	DATE LIMIT MADE	LIMIT MADE BY
DOWN PAYMENT $ — DUE DATE — C. B. D.			COL. ROUTE	C. C. MADE	C. C. IN
DATE	CHARGE	CREDIT	BALANCE	NOTICES SENT	REMARKS
	CONTINUE ON REVERSE SIDE			DATE ALL ENTRIES - WRITE SMALL AND NEAT - BE BRIEF	

Record Card

Follow-up

Mr. Burdick favors the use of the telephone as an aid to follow-up because the customer can be reached easily, and without delay, and the effect is generally as good as a personal call, which is much more expensive. "The essential in collections," Mr. Burdick says, "is to get the invoice out promptly and correctly and follow-up immediately when due and at definite intervals until settled."

By following this method, he states, collections on all accounts are made regularly, effectively and inexpensively.

Estimating Methods---XIII

Power Wiring
Industrial Lighting
Grounding
Control Equipment
Motor Feeders
Overhead

By ARTHUR L. ABBOTT
Technical Director, Association of Electragists, International

PRACTICAL methods of estimating quantities of conduit and wire for motor circuits and the labor for installing this material were discussed in a previous issue (December, 1927). A complete estimate of the power wiring, including the service and motor control equipment, also of the wiring and equipment for lighting in a small industrial plant, is shown here as an example of the application of a number of the tables of labor data published in preceding issues. The power layout used is the same as one previously shown, except that wire sizes have been

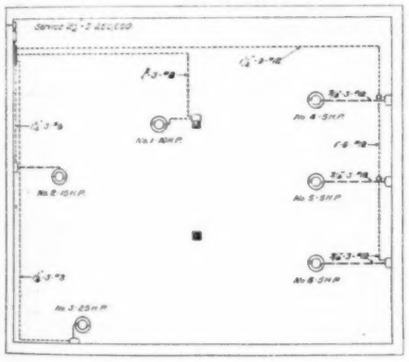


Fig. 1—Power Lay-out

changed to conform to the new motor wiring tables in the 1928 Code.

This small industrial plant is located on one floor of a building occupied by several manufacturers. Fig. 1 is a floor plan showing the power layout and Fig. 2 is the lighting layout. The walls are brick, the ceiling is wood joists and there are two wood columns on the center line of the room. The inside measurements of the room are 40 feet by 48 feet, the ceiling height is 12 feet.

A sensible estimate can only be made from a layout like Fig. 1. The plan can be drawn on any sheet of paper using a folding pocket rule for a scale and straight-edge. The approximate position of the motors, starters and service switch should be indicated on the plan.

The next step is to determine the wire and circuit fuse sizes for the motor circuits. This data is determined from the motor tables in the 1928 National Electrical Code (See THE ELECTRAGIST, April, 1927.) All motors are to be squirrel-cage induction type, 3-phase, 220 volts.

It is convenient to set down this data in the form of a table on a sheet of the estimating form 2E, as shown here (Sheet No. 1). As this table must be made up before the estimate is made, it would naturally be placed at the top of the sheet, but has been placed at the bottom in this case so that the conduit and wire quantities may be entered directly beneath the printed column headings.

The full load currents are first taken from Table 4 in the Code. Next referring to the Code Table 1 the wire sizes and sizes of branch circuit fuses are found. All wire is of course to be rubber-covered. Motors Nos. 1, 2 and 3 are to have starting compensators, therefore the size of branch circuit fuses is found in Column 8, headed "Squirrel-cage, reduced voltage starting." Motors Nos. 3, 4 and 5 are to be equipped with double-throw starting switches and will start at full voltage, therefore the size of branch circuit fuses is taken from Column 7. The size of the running fuses for three motors is given in Column 5. Running protection for the three larger motors is provided by the overload relays with which the compensators are equipped.

The Code requires a switch ahead of each compensator which must have a capacity of at least 115 per cent of the full load running current of the motor. This determines the sizes of the switches designated as "disconnect" switches in our table. Strictly according to Code definitions these are "motor circuit switches" and not disconnecting switches, but the distinction is of no importance in this case.

The three 5 h. p. motors are grouped near together and at some distance from the center of distribution and without making any calculations it is evident that it will be economical to carry the three circuits across the room in a single 1-1/4 in. conduit rather than to run three 3/4 in. conduits.

It is interesting to investigate the possibility of making a saving by running a feeder to supply the three small motors. The new Code recognizes the logic in permitting the application of a demand factor in determining the size of such a feeder, but leaves the decision up to "the authority enforcing this Code." For a small number of motors a common rule is to make the carrying capacity of the feeder equal to the starting current of the largest motor, plus the sum of the running current of all the others. Following this rule, and taking the size of the branch circuit fuses as the starting current, the feeder capacity must be 45 amp. plus 2x15 amp. = 75 amp. This requires a No. 3 feeder.

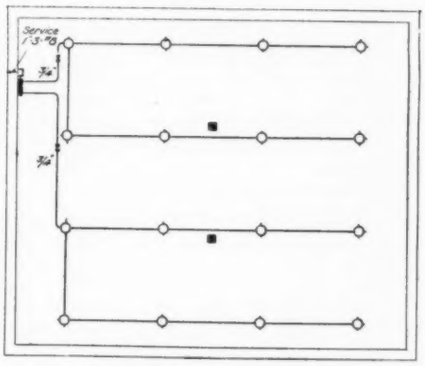


Fig. 2—Lighting Lay-out

With motor-starting switches which cut out the running fuses during the starting, the wires from starting switch to motor are considered by the Code to be sufficiently protected if the fuses next back on the line are rated at not over 500 per cent of the full load motor current. The full load current of each 5 h. p. motor is 15 amp. and 500 per cent

FEEDER SCHEDULE

Job Small Industrial Plant — ESTIMATE NO. — SHEET NO. 1 — OF 5 SHEETS

ESTIMATED BY — DATE 6-1-28

Motor No.	H.P.	FROM	TO	CONDUIT SIZE	CONDUIT LENGTH	CONDUIT LG.	CONDUIT TERM.	CONDUIT BENDS	WIRE NO. WIRES	WIRE SIZE	WIRE LENGTH		
1	10			1"	50'				3	#8	171		
2	15			1¼"	30'				3	#6	111		
3	25			1½"	59'				3	#3	198		
4	5			1¼"	56'				9	#12	531		
				¾"	18'				3	#12	63		
5	5			1"	9'				6	#12	60		
				¾"	16'				3	#12	63		
6	5			¾"	25'				3	#12	90		
		Service		2½"	16'				3	250	69	1-LB 1-FE	Conduitet "
		Ground		1"	20'								
			TOTALS	¾"	1"	1¼"	2½"		#12	#8	#6	#3	250
				18'	50'	30'	16'		531'	171'	111'	198'	69'
				18'	9'	59'			63'				
				25'	20'	56'			60'				
									63'				
									90'				
				87'	79'	145'	16'		807'	171'	111'	198'	69'
		Allowance		3'	1'	5'	4'		23'	9'	9'	2'	1'
				80'	80'	150'	20'		830'	180'	120'	200'	70'

DATA

Motor No.	H.P.	Full Load Amp.	Branch Circuit Fuses Amp.	Running Fuses Amp.	Wire Size	Conduit Size	Compensator	Disconnect Switch Amp.	Starting Switch Amp.
1	10	27	70		#8	1"	x	60	
2	15	38	80		#6	1¼"	x	60	
3	25	64	150		#3	1½"	x	100	
4	5	15	45	20	#12	¾"			30
5	5	15	45	20	#12	¾"			30
6	5	15	45	20	#12	¾"			30
		174							

PRICING SHEET

Job Small Industrial Plant — ESTIMATE NO. — SHEET NO. 2

WORK Power — OF 5 SHEETS

ESTIMATED BY — PRICED BY — EXTENDED BY — CHECKED BY — DATE 6-1-28

MATERIAL	QUANTITY	MATERIAL LIST PRICE	PER	DISC.	EXTENSION	LABOR UNITS/UNIT	PER	EXTENSION
Average Run				(Table)		Hours		Hours
¾" Conduit 20'	60'			3		6	C'	360
1" " 27'	80'			3		13	C'	1040
1¼" " 50	150'			3		14	C'	21
Nipples - 1" Terminals	2			1		25	ea.	50
1¼" "	4			1		40	"	160
2½" Conduit	20'			1		8	C'	160
2½" Terminals	8			1		1	ea.	8
¾" Flex. Conduit	6'							
1" " "	2'							
1¼" " "	4'							
#SP6173 -¾" Comb. Couplings	3			1		30	ea.	90
#SP6174 -1" " "	1			1				25
#SP6175 -1¼" " "	2			1		40	ea.	80
#SP6124 -¾" Connectors	3							
#SP6125 -1" "	1							
#SP6126 -1¼" "	2							
FE7 Condulet	1							
LB77 "	1							
#83 " Cover	1							
#800f " "	1							
Supports for 2½" -								
Expansion Bolts in brick	6			2		13	C	78
Drill brick wall	1							150
#72171 4-11/16" Square Box	1							
#72151 4-11/16" " "	1							
#72 - C - 1 Blank Covers	2							
#12 R.C. Wire	830'			6		6	M'	498
#8 " "	180'			6		10	M'	180
#6 " "	120'			6		14	M'	168
#3 " "	200'			6		16	M'	320
250,000 c.m.	70'			6		47	M'	329
								6558

PRICING SHEET

Job Small Industrial Plant — ESTIMATE NO. — SHEET NO. 3

WORK Power — OF 5 SHEETS

ESTIMATED BY — PRICED BY — EXTENDED BY — CHECKED BY — DATE 6-1-28

MATERIAL	QUANTITY	MATERIAL LIST PRICE	PER	DISC.	EXTENSION	LABOR UNIT NO.	PER	EXTENSION
				(Table)		Hours		Hours
Panelboard and Cabinet-								
60a. Terminals (3 branches)	2			9		55	ea.	495
100a. " (2 branches)	6			9		78	"	468
200a. " (1 branch)	3			9		113	"	339
400a. " (mains)	3			9		163	"	489
30" x 30" Steel Box on brick	1			12				160
60a. 3P. Switch on brick	1			16				250
60a. 3P. " on wood	1			16				220
100a. 3P. " on brick	1			16				390
400a. 3P. " on brick	1			16				790
30a. 3P. Starting Switches on brick	3			17		290	ea.	870
Starting Compensators -								
10 H.P. on wood	1			18				5
15 H.P. on brick	1			18				7
25 H.P. on brick	1			18				780
Fuses - 20 amp.	9							
30 - 60 amp.	9							
65 -100 amp.	6							
150 amp.	3							
250 amp.	3							
Grounding Material -								
T 833 Condulet 1"	1							60
#300 " Cover	1					25	ea.	
GG 153 " " 1¼	3							75
GG 1670 " " 2½	1							25
GGA 32 Ground Clamp "	1							50
								6861

PRICING SHEET

Job Small Industrial Plant — ESTIMATE NO. — SHEET NO. 4

WORK Lighting — OF 5 SHEETS

ESTIMATED BY — PRICED BY — EXTENDED BY — CHECKED BY — DATE 6-1-28

MATERIAL	QUANTITY	MATERIAL LIST PRICE	PER	DISC.	EXTENSION	LABOR UNITS/UNIT	PER	EXTENSION
				Table)		Hours		Hours
1/2" Conduit	170'			7		280	C'	476
3/4" "	50'			7		330	C'	165
1" "	20'			1		330	C'	66
1" Terminals	6			1		25	ea.	150
FE3 Condulet	1							
LB33 "	1							
#33 " Cover	1							
#300f " "	1							
Supports for 1"								
Expansion bolts in brick	3			2		13	C	39
Drill brick wall	1							1
#54151 Outlet Boxes 4" Oct.	16			7		72	C	1152
#54012 Covers	16							
#14 R.C. Wire	580'			8		6	M'	348
# 8 " "	90'			6		12	M'	108
30 amp. 3P. Meter Service Switch	1			16				8
6-Circuit Panelboard and Cabinet	1			10				8
Plug Fuses	8							
#18 Reinforced Cord	16'							
200w. RLM Reflectors and Sockets	16			8		30	ea.	8
200w. Lamps	16							
								4304

Estimate Sheets Nos. 1, 2, 3 and 4 Filled in to Show Their Use for an Industrial Installation

of this is 75 amp. This is not a commercial size of fuse so an 80 amp. fuse would probably be permitted. A No. 3 feeder would therefore be satisfactory with unfused taps from the feeder to the starting switches.

These taps will be less than 25 feet long and will be run in conduit and so may have 1/3 the carrying capacity of the feeder; 1/3 of 80 amp. is 27 amp., therefore the taps may be No. 8 wire. Thus the two alternative methods are:

(1) From a 100 amp. branch on the panelboard run 3—No. 3 in 1-1/4 in. conduit and run a tap consisting of 3—No. 8 in 1 in. conduit from the feeder to each of the three starting switches.

(2) From three 60 amp. branches on the panelboard run 9—No. 12 in 1-1/4 in. conduit and continue each circuit in 3/4 in. conduit to the starting switch.

On this small installation the difference in cost between the two methods is not great, but method (2) is cheaper.

Carrying Capacity

Adding together the running currents of all motors as set down in the table, the total is 174 amp. The largest motor is 25 h. p. Assuming as before that the ampere capacity of the circuit fuses is the starting current, the excess of starting current over running current for the largest motor, 25 h. p., is 150 amp.—64 amp. = 86 amp. Using the rule previously referred to, the carrying capacity of the service conductors must be 174 amp., the running current of all motors, plus 86 amp., the excess starting current of the largest motor, or 260 amp. This is 10 amp. over the carrying capacity of 250,000 c. m. but this size would be ample and would probably be approved. All data is now provided to complete the layout.

A 400 amp. 3-pole switch will be required for the service. Metering provisions will depend upon the requirements of the local central station company. It is assumed that the service mains will extend from the service switch into a 30 in. by 30 in. steel box in which current transformers will be mounted, the mains to continue from this box to the cabinet containing the branch circuit distribution panelboard. Connections from the current transformer box to the meter are neglected.

Conduit lengths are scaled from the drawing with a rotometer or a draftsman's scale, or in a pinch with an ordinary rule. The short method of estimating labor is to be used so it is only necessary to enter sizes and lengths on the form. Making the proper additions to conduit lengths for the extra length of wire required in ach case and multiplying by three gives the total length of wire in each run, and these lengths are also entered.

This being a 3-phase system with no one of the service conductors grounded, no system ground need be provided. A ground connection must be provided for the service conduit and other equipment, for which either a 1 in. conduit or a No. 2 wire is required.

The lighting installation will require both a system ground and an equipment ground. One way to fulfill all grounding requirements is to install a 1 in. conduit from the lighting service switch box to the proper point for grounding to a water pipe, this conduit to contain the No. 8 wire required as the lighting system grounding conductor. The conduit will serve as the equipment grounding conductor for both the lighting installation and the power installation. A T fitting is inserted in the 1 in. grounding conduit just outside the lighting switch box and a 1 in. conduit is run from this fitting to the power service switch box. A bonding jumper must be installed inside each service switch box to connect the service conduit to the grounding conduit. All material for grounding except the No. 8 wire for the lighting system ground is included in the power section of the estimate.

There being plenty of space left on the form, the conduit and wire quantities are totaled on this sheet, though of

RECAPITULATION

FORM 9-E

ESTIMATE NO. ——

JOB Small Industrial Plant

SHEET NO. 5

OF 5 SHEETS

ESTIMATED BY CHECKED BY APPROVED BY

DATE 6-1-28

SHEET NO.	DIVISION	MATERIAL	LABOR-HOURS
2	Power	11688	6558
3	Power	10561	6681
4	Lighting	11855	4104
	MISCELLANEOUS MATERIAL AND LABOR	500	400
	NON-PRODUCTIVE LABOR		800
	TOTALS-MATERIAL COST-LABOR HOURS	34594	18533
	AVERAGE LABOR RATE PER HOUR		92½
	LABOR COST		17134
	MATERIAL COST		34594
	JOB EXPENSE		1600
	TOTAL PRIME COST		53328
	31% OVERHEAD		16532
	TOTAL NET COST		69860
	10% PROFIT		6986
	SELLING PRICE		76846
	PRICE QUOTED		76800

NON-PRODUCTIVE LABOR	HOURS
HANDLING MATERIAL	
LOST TIME	
TRAVELING TIME	
TOTAL	

JOB EXPENSE	
BOND	
PRO RATA CHARGES	
INSURANCE Compensation	300
WATCHMAN	
TELEPHONE	
DRAWINGS	
INSPECTION	700
LICENSE	
STORAGE	
FREIGHT, EXPRESS AND CARTAGE	600
R. R. FARE AND BERTH—	
ROUND TRIPS AT	
BOARD MEN WEEKS AT	
TOTAL	1600

1 Journeyman $1.10 per hr.
1 Helper .75
1.85
Average rate .92½

Fig. 3—Recapitulation Sheet

course a sheet of Form 3-E, the Conduit and Wire Summary, may be used if preferred. Small allowances are added as usual to bring the totals up to even figures.

For a large motor installation it would be necessary to summarize and total a number of items such as compensators, disconnecting switches, starting switches and fuses, but for this small and simple job these items can easily be taken from Sheet 1 and entered directly on the pricing sheet.

As the conduit quantities are filled in on the pricing sheet it is well to note for each size the average length of run because the labor units to be used depend upon these average lengths. A glance at the summary on Sheet 1 shows that there are three runs of 3/4 in., the total length is 60 feet and the average is 20 feet; three runs of 1 in., total 80 feet, average 27 feet; three runs of 1-1/4 in., total 150 feet, average 50 feet.

For connections between switches and compensators one 1 in. nipple and two 1-1/4 in. nipples will be required and to make the labor estimate complete two terminals must be included for each nipple. These nipples are not to be considered as "runs" in finding the average length of run.

All motors are equipped with conduit terminal boxes and connection to these is to be made with short lengths of flexible conduit. The quantities of rigid conduit displaced by the flexible are not taken into account in this estimate because the total length of flexible of each size is less than 10 feet. The conduit, combination couplings and connectors are listed on the pricing sheet, though it is entirely optional with the estimator whether he will list these details or cover them in a lump sum for all miscellaneous material items.

Lighting Layout

For the work to be done in this space a general illumination of 10 foot-candles intensity is considered satisfactory. The ceiling height is 12 feet. Benches may be used along the two longer sides of the room, therefore the two rows of outlets nearest to these walls should be not over 3 feet from the walls. The ceiling height is 12 feet, and RLM reflectors are to be used.

The outlet arrangement shown in Fig. 2 with 200 watt lamps hung 1 foot below the ceiling, satisfies all conditions. The spacing and mounting heights are correct to produce uniform illumination. A depreciation factor of 70 per cent has been allowed, that is, the 10 foot-candles will be provided after the light from each lamp has been cut down to 70 per cent of the original value due to the accumulation of dust on the lamp and reflector and aging of the lamp.

Circuits

The layout provides for four two-wire branch circuits with four 200-watt lamps per circuit. Two circuits would meet the Code requirements, but some excess capacity is desirable and with each row on a separate circuit the lights can be conveniently controlled by circuit switches on the panelboard. The four circuits might have been carried out from the cabinet in two 1/2 in. conduits but 3/4 in. conduit is used because the cost is very little greater and two additional circuits may be pulled in if they should be needed at any time in the future.

The connected load is 3,200 watts. Allowing for two additional circuits at 800 watts each the total is 4000 watts. The service is to be 3-wire, 110-220 volts, so the total load is equivalent to 18.2 amp. Three No. 8 wires will therefore be of ample size for the service, No. 8 being the minimum size permitted for service conductors by the 1928 Code. The service conduit will enter a 30 amp. meter service switch and a 6-circuit panelboard will be installed.

The lighting layout is here shown separate from the power layout for the sake of clearness, but when drawn to a scale of 1/4 in. = 1 foot, the two could easily be shown on one plan without any confusion.

This installation is so simple that nothing is to be gained by setting down the quantities on a branch circuit schedule sheet and then transferring them to a pricing sheet. The quantities as taken off the layout can be entered at once on the pricing sheet. The labor will be figured by the short method for exposed branch lighting work so it is not necessary to count the pipe entrances nor to figure labor on pipe straps and outlet box fastenings.

For the reader's convenience, references are given on the pricing sheets to the tables from which the labor units are taken.

Referring to Sheet No. 2, Table 3, is intended to be used for the motor branch circuit conduit in installations of this general type. Table 1 must be used for the 2-1/2 in. service conduit. A small number of condulets or similar fittings may be covered by figuring the regular allowance for the pipe terminals at the condulets.

Some additional labor will be required to install the flexible conduit connections to motors. As a convenient method of approximating this labor each length of flexible may be assumed to require the same time as one rigid conduit terminal of the same size.

In selecting the hours per 1000 feet for the various sizes of wire from Table 6, the number of runs should be disregarded and the units should be used which apply to the total lengths of wire. This is for the reason that all the work is done in one small space and no time need be lost in picking up the material, going to the work, etc. Anyway, the wire-pulling labor is a small item and it would be a waste of time to follow out the complete method explained in connection with Table 6. This method is chiefly intended to be applied to the larger sizes of wires and cables.

The two 4 11/16 in. square boxes are to be used as pull-boxes. Labor on these is neglected as it would be a very small item.

On Sheet No. 3, labor units for the panelboard and cabinet, box for current transformers, switches and compensators will be easily found by referring to the tables indicated. The grounding bushings listed are provided with tapped holes for attaching a lug to the bushing; 1/4 hour has been allowed for each bushing and 1/2 hour for the ground clamp.

Conduit and Drop Cords

The branch conduit work for lighting (Sheet No. 4) is Class El as listed in Table 7, i. e., exposed work on wood. The 1 in. service conduit must be figured from Table 1, making an additional allowance for pipe straps fastened to a brick wall as per Table 2. The time given in Table 8 for drop cords, 1/2 hour each, can be reduced somewhat under favorable conditions, but these drops will be somewhat difficult to install because they will be very short and the full time allowed will be none too much.

Whenever as many as three pricing sheets are required for a job the Recapitulation Sheet, Form 5-E (Fig. 3) should be used for totaling the material costs and labor hours and making up the final figures. The greatest value of

this form lies in the fact that it contains spaces for miscellaneous labor and material, non-productive labor, job expense, prime cost, overhead, and total cost, and thus serves as a reminder that all these items should be considered. Some contractors consider it worth while to use this form for every estimate even when only one pricing sheet is used, in order to make certain that all the elements of cost will be accounted for.

The material costs shown on the recapitulation sheet are merely approximate figures set down to illustrate the use of the form. The totals of material costs and labor hours are first brought forward and entered. Miscellaneous material will, in this case, cover solder, tape, locknuts and bushings, wood screws and other small items. Miscellaneous labor is an allowance for productive labor items which may not have been fully covered in the labor estimate.

Non-Productive Labor

In the first installment of this series a tentative method of computing non-productive labor was given which calls for 3 per cent of the first 1000 hours or less of productive labor. Three per cent of the estimated productive labor on this job would be 5 1/4 hours. The non-productive labor in this case will include going to the job when it is started, leaving the job if work is not finished exactly at noon or quitting time at night, receiving tools and materials, picking up and loading tools and material when the work is completed, and perhaps some other items. Eight hours is probably the least allowance that can safely be made. Quite evidently, the 3 per cent rule does not work out right on so small a job.

Note that for a job involving about half as much labor as this one the non-productive labor would still be about the same number of hours. The non-productive labor item becomes increasingly more important as the size of the job decreases and on small work the allowance for this item must be determined by common sense, rather than by any rule.

The totals for material and labor are now found and the total hours are multiplied by the average cost per labor hour to find the labor cost in dollars. It is assumed that this work will be done by one journeyman and one helper and at the assumed wage rates the average cost per hour will be 92 1/2 cents.

The material cost is now brought down under the labor cost, the job expense is computed and the three items are totaled, giving the total prime cost of the job.

The overhead expense on this job cannot be stated as a fixed amount or fixed percentage, but will depend upon the contractor's actual overhead and so must be deduced from his own records. The job overhead is most commonly figured as a percentage of the prime cost, though there are some good arguments in favor of the method of using a charge per hour of labor. Assuming that the contractor's annual volume of business is $100,000 and that his average overhead is 30 per cent of his annual total cost of labor and material, a reasonable charge on this job would be 31 per cent of the prime cost. Adding this to the prime cost gives the total cost, or the real cost of the job.

Whatever amount is added to the total cost as net profit (or deducted as net loss) must be left entirely to the contractor to determine. It is almost universally agreed that an addition of 10 per cent of the prime cost is a fair and reasonable amount, though as a matter of fact on the majority of competitive jobs the successful bidder is the man who has made a deduction at this point, instead of an addition.

Sound Trade Relations

(*Continued From Page* 21)

community, the value of its most extensive good will advertising is nullified by the first electrical man the public comes in contact with. Let me give you a practical, convincing illustration.

You are in the market for a new car. You have noticed the beautiful advertising of a certain make and decide to investigate. You go to the sales room and are met by a polished salesman. He leaves nothing unsaid in a finished sales talk, and you are just about convinced you cannot get along without this particular car. However, you decide to think it over for a day or so, and as you leave you are given an expensive, illustrated booklet describing this super car. When you turn the corner you see a mechanic tuning up one of these cars near the service entrance, and you go up and innocently engage him in conversation. After asking a number of questions you say: "Well, what do you think of this car?" And he replies: "Well, it is a good car if you can afford to run it, but, boy, it *does* eat the gas." Advertising, sales talk, and expensive literature shot by one sentence from a simple mechanic.

Out in the mountains east of Fresno your industry is spending vast sums of money in the erection and testing of a dam. Not a dollar put into this experiment will be directly returned as this dam will be strained to destruction in order to get data for future dam construction. What is all this for? To increase your scientific knowledge on power development. What are you going to do with this power after it is developed? Why should not your sales engineers be just as highly trained as your development engineers, and equal sums be spent in developing the market for your power along just as scientific lines as the development of the power itself?

Steady Development

Ever since the day the first K. W. of unsold power was developed we have been putting on campaigns, leading the public to believe there were bargain days to get this luxury. I believe that that day is past and we should settle down to a steady development of a sound, constructive sales program, based on the united study of the best minds in the industry, and not the disjointed, conflicting ideas of wild theorists anxious to make a reputation.

As the daddy of the industry, you are responsible to the branches that have been created as a result of your growth. Ignoring the welfare of these branches for selfish reasons is as unnatural and unsound as for a human father to forget his responsibilities to his family.

Therefore, may I, as a representative of the weaker son of this family, appeal to your sense of justice and fair play, to increase your interest and careful consideration of our growing problems?

We look to you not only to set the example, but to lead the way in raising the standards of industry salesmanship, and those standards must be of such high order, and so fundamentally sound, that they will rally the support of the entire industry. This will not be brought about by a shrug of the shoulder or a wave of the hand, but if Daddy Central Station and Mother Manufacturer and Brother Jobber and Brother Contractor-dealer will sit down to the family table, and tackle this family problem in a loyal family spirit, the solution will be found just as surely and as rapidly as you are solving your problems in development engineering.

"Special Rules"

A Menace to the Electrical Industry

By HARRY B. KIRKLAND
Director, Uniform Ordinance Department, The Society for Electrical Development, Inc.

AT a moment when the whole industrial world is moving towards standardization of products, the electrical industry continues to suffer from the plague of special rules that keep prices up and holds efficiency down. I mean the special rules enacted by municipalities everywhere—the rules that establish different conditions for doing very much the same thing, when a standard rule would achieve the result in a better way.

It is this tendency toward special requirements which frequently require special materials that the code promotion unit of the Society for Electrical Development is trying to overcome. We have no quarrel with the man who has some pet rule in mind that he would like to see adopted into his ordinance. What we do desire is that the special rule shall not conflict with the work carried on by the Code committee. When neighboring cities, that are working toward the same general goal, express their ordinances in many different ways, it only leads to confusion. What we are working toward is standardization of terminology—standard "language" for each municipality's ordinance. And this standard terminology is contained in the uniform electrical ordinance.

Our work in the field of promoting codes, ordinances and statutes has been nationally recognized as a movement in the right direction. What we seek is not the promotion of any rules or requirements other than those promoted by the industry. The manufacturers, together with the electragists, the inspectors and the jobbers, have representatives sitting in on the formation of these rules.

The uniform electrical ordinance has been adopted by scores of towns and cities and has had a wide influence toward improvement. Without it, it is hard to imagine where the industry would be today. New Orleans, the first city in the United States to realize its value, adopted it into their city ordinance word for word. After three years of successful operation, they have no regret for having taken this step. Only recently, George Welman, chief electrical inspector, Louisiana Rating and Fire Prevention Bureau, had the following to say in one of his "News Letters;"

"This bureau recommends the uniform electrical ordinance of the Electrical Manufacturers' Council of the Society for Electrical Development. Our inspectors advise that Morgan City, Louisiana, and Many, Louisiana, will introduce the uniform ordinance at an early meeting of the city Commission Council.

"The uniform ordinance is fair and square to everybody and protects the user of electric current by requiring reasonably safe construction. If we had the time to visit every city and town in the state, we believe that every municipality in the whole State of Louisiana would have a uniform electrical ordinance.

"What we are trying to do now is to get the police jury of each parish in the state to appoint an inspector for the rural districts and adopt the uniform ordinance. May we request the contractors to help us get this movement under way?"

The above speaks for itself and is but one example of a city's successful adoption of the uniform ordinance. I am happy to say that a gratifying number of municipalities throughout the country have rapidly followed suit and have adopted the National Electrical Code in its entirety, without special rules of any kind.

Certainly the uniform ordinance has yielded splendid results, but we have yet to make it fully effective in the broadest sense. With the daily growth of the electrical industry, with the use for power for so many new purposes constantly growing, the need is more urgent than ever before. Only by organization and cooperation shall we provide the protection so essential for a normal, healthy growth of the electrical industry.

This matter of special rules has so many aspects that I hardly know which should be the most emphasized. Perhaps I had best leave that matter to the daily experience of electrical men, for each one has a better story than the other of his troubles with certain rules. Some day I may be tempted to catalogue the commonest troubles arising from these rules. Without considering them in detail we may as well assert that every special rule in opposition to the uniform ordinance is an economic waste. When manufacturers are compelled to make standard equipment to meet special rules, no one profits. The cost naturally goes up, but there is no profit in this increased cost, because economic laws exact heavy penalties wherever special material or equipment must be turned out in small quantities.

Despite all the activities of our organization, however, the bane of special rules seems to be flourishing. Wherever we are able to pluck out one rule in a local ordinance, two more seem to crop up in the same place. This is a natural, if an undesirable, result of the swift pace that marks the electrical world. As new uses and extensions of old ones are found for electrical current we may be certain that the lawmakers will find new curbs to hobble the industry. One of the first and evident means of combatting this tendency is prompt and forceful representation before the law-making bodies. We have no quarrel with municipalities that adopt special rules for the better protection of life and property. But, after a special rule has been adopted requiring some unstandardized equipment, it is difficult to argue for repeal. But in advance of the passing of these special requirements, we may rally plain common sense to our support, provided we know about it.

MUNICIPALITIES everywhere are enacting special rules. These tend to increase the cost of electrical installation. The uniform electrical ordinance was framed to standardize municipal ordinances. Mr. Kirkland, in this article, describes some interesting developments in the struggle against costly special rules. He says, "When neighboring cities, that are working toward the same general goal, express their ordinances in many different ways, it only leads to confusion. What we are working toward is standardization of terminology—standard language for each municipality's ordinance."

I challenge any one to offer a better set of rules than the National Electrical Code, as prescribed by the uniform electrical ordinance. The Electrical Committee has been working intensively for some time past to bring the National Electrical Code up to date and the 1928 Code comes nearer to meeting the advanced requirements of the field, is better correlated and easier to use than any previous Code. In the meantime we can give any community the advantage of rules that are in process of formation, so that they may have in advance of publication the proper "language" for their proposed codes. Results in the last year, so far as the adoption of the National Electrical Code is concerned, have surpassed the work of all other years.

Every time this issue comes before a city council, its supporters maintain that safety is their big consideration—they must keep down fire risks, and so on. Our reply is: The uniform electrical ordinance. This contains the consensus of expert opinion after years of study and experience. Into this ordinance we have packed the knowledge and experience of the whole industry. It would be difficult indeed to improve upon the phrasing or the provisions themselves. No other document that has ever come to my attention was more carefully prepared.

Yet it is an every day experience to hear some legislator, not a technical man, argue his opinion against expert knowledge. He is known to his colleagues personally and his views carry weight; the electrical industry is a vague, far-away influence. Right here is where he puts over the special rule that means special equipment at a high price. The public is the one that pays the extra cost. We must present our case more clearly, more forcefully, than our opponents are able to do. This subject needs the best thinking that we can give it.

Proper Inspection

The most convincing answer to those who argue about fire hazards can be presented in two words—*proper inspection.* Or I might better express the matter by the word *reinspection.* The first is essential and the second paramount. Often it is possible to influence a law-making body by examples of how the ordinance works, coupled to competent inspection. There, virtually, is our whole case. It is well enough to make claims and demonstrate what can be accomplished, but it is much more convincing to show what actually has been accomplished by the uniform ordinance. I have never found this argument lacking in weight. Almost any man will listen to a record of facts more quickly than he will heed promises.

A large part of the benefits accruing from the ordinance depends upon inspection and reinspection—which means on the inspector himself. The best ordinance ever framed—which the uniform ordinance certainly may be called in the electrical world—will not be much more effective than the worst inspector who sees that it is carried out. Here we have the human equation in its most puzzling form. I may say that the general average of electrical inspection is better than it used to be. But it is still far short of what it should be in many municipalities. The inspectors are not always at fault. Often they are men of training and conscientious in their work. Yet the political system that exists in some localities makes their jobs prizes to be always sought, and this system cannot possibly put the right men in the right places, except by chance.

Considering the faults of this system, it really is remarkable that we have

(*Continued on Page* 31)

Causes of Non Approval

WHY does the inspector withhold approval from electrical installations? There are many causes, of which the most important have been itemized by Paul O. Neumann, assistant wiring inspector, Holyoke, Mass., who states:

"In my opinion sixty percent of the violations are due to carelessness. In some instances this may be due to a low estimate of time figured for labor on a contract, resulting in omissions such as joints left unsoldered and taped, loose ground clamps and connections, meter loops not marked, etc. Twenty percent may be due to a lack of knowledge or misinterpretation of the rules. Twenty percent may be due to the wireman not being furnished with proper or sufficient material by the contractor to complete the work, with the result that covers are left off on conduit fittings or boxes, improper fusing, etc."

From the last fifty non approved jobs Mr. Neumann notes violations occurring as follows:

Violation	Number
Improper separation distance of wires	1
Metal raceways, armored cable, or conduit not grounded	4
Place cutout where size of wire is changed	1
Splices or joints in wire not properly soldered or taped	5
Wiring without permit ordered disconnected and taken down	2
Motors not properly connected	2
Meter loops not plainly marked	3
Wires subject to mechanical injury	2
Open knockouts in outlet or switch boxes	2
Ground wires not properly soldered to ground clamps	5
Blank covers on boxes or conduit fittings missing	9
Outlet plates not approved	3
Armored cable not properly supported or secured to connectors, outlet boxes or plates	7
Neutral fuse omitted	2
Secondary ground wire smaller than No. 8 B & S Gauge	1
Service switch should disconnect service fuses	3
Wires improperly entering cabinets	1
Motor circuit overloaded	2
Sockets of type not approved for location	1
Fixtures not properly supported	1
Outlet box or plate not installed at each outlet	1
Load out of balance	3
Wires fused beyond their safe carrying capacity	5
Circuits overloaded	3
Ground electric range	1
Rheostats not mounted on slate base	1
Broken conduit fitttings not replaced	2
Meter device not properly connected	1
Ground clamps loose	2
Fasten cross-over tubes	1
Each meter not protected by cutout	1
Improper terminal fittings for conduit	1

Industrial Substations Provide Business for Contractors

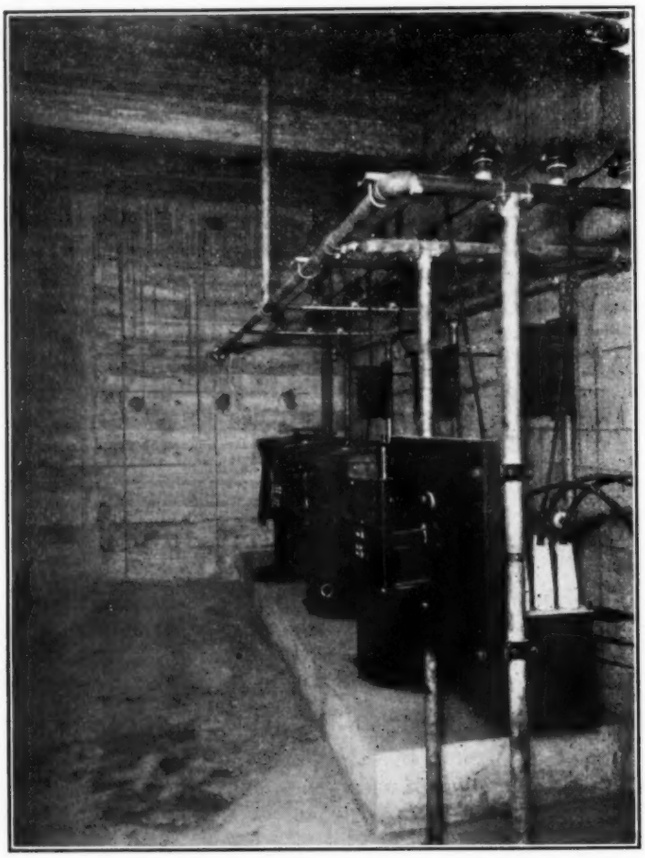


Fig. 1—Transformer in Large House

THE GROWTH in number of industrial substations which are being installed by electrical contractors is illustrated by the increase in this line of work handled by Walter Knapp, Inc., electragist of New York City. Although the headquarters of this contractor is in New York, most of the substations are installed in other sections of the country, from Long Island to Florida.

Industrial concerns buying a rather large amount of power find it profitable to purchase electricity in bulk at high tension, having their own substation to step the power down to the voltage they desire.

Such jobs may be obtained, according to Walter Knapp, president of the company, mainly through prestige, and prestige is acquired by making good installations. Mr. Knapp finds most of his jobs come from concerns which have heard of his work from some job he has completed; consequently he rarely has any competition and can sell the job at fair price on a quality basis.

In most cases he not only makes the installation but sells all of the equipment, including transformers, circuit breakers, switches, panelboards, high tension insulators, and other materials. In estimating for these jobs it is im-

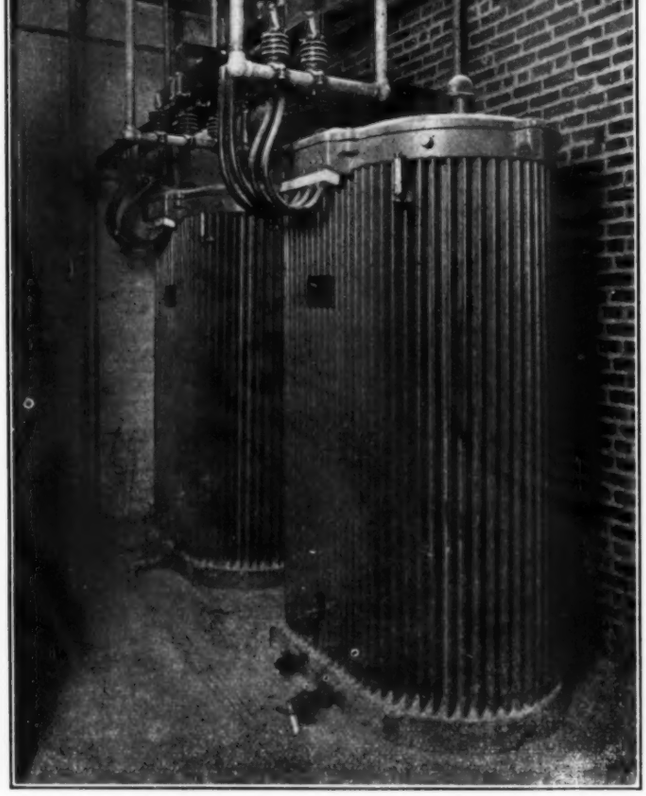


Fig. 2—Transformer in Baking Plant

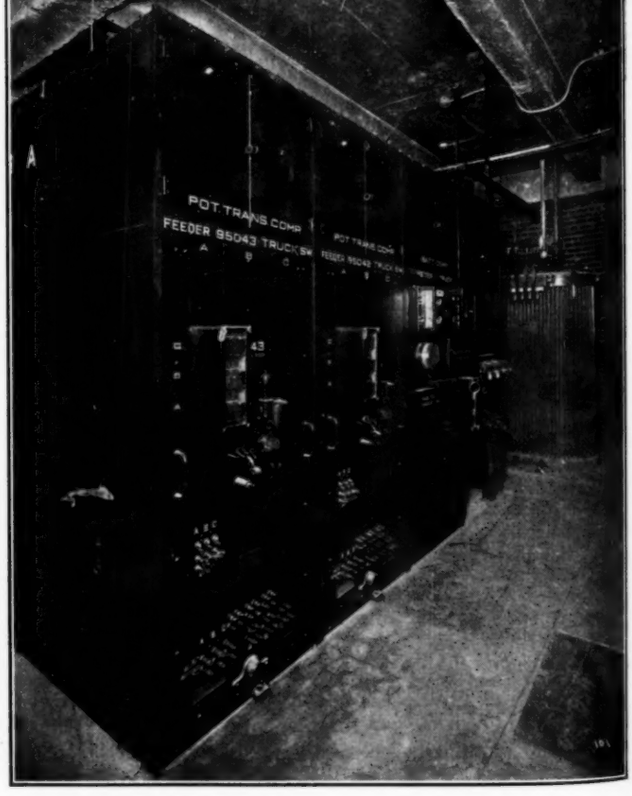


Fig. 3—Panelboard in Baking Plant

possible, according to Mr. Knapp, to give a price without having all the specifications of the job in mind. Substations vary so greatly in types that it is impossible to have an average job, or figure the price on a cost per k. v. It is quite easy for an electrical contractor to lose a lot of money on an installation of this kind unless he is very careful in his figures and knows what he is doing. And if the contract is closed, and it appears that the contractor will lose money before the job is finished, it is impossible, even if it was desirable, to save money on materials, for in this type of work only the best equipment is safe.

The illustrations show two rather unusual installations. Fig. 1 is a transformer vault in the home of J. P. Donahue, in Palm Beach, Fla., a very large house. The illustration shows the transformers mounted on a raised concrete platform, specified by Mr. Knapp because it makes it much easier to draw off the oil from the transformers when necessary.

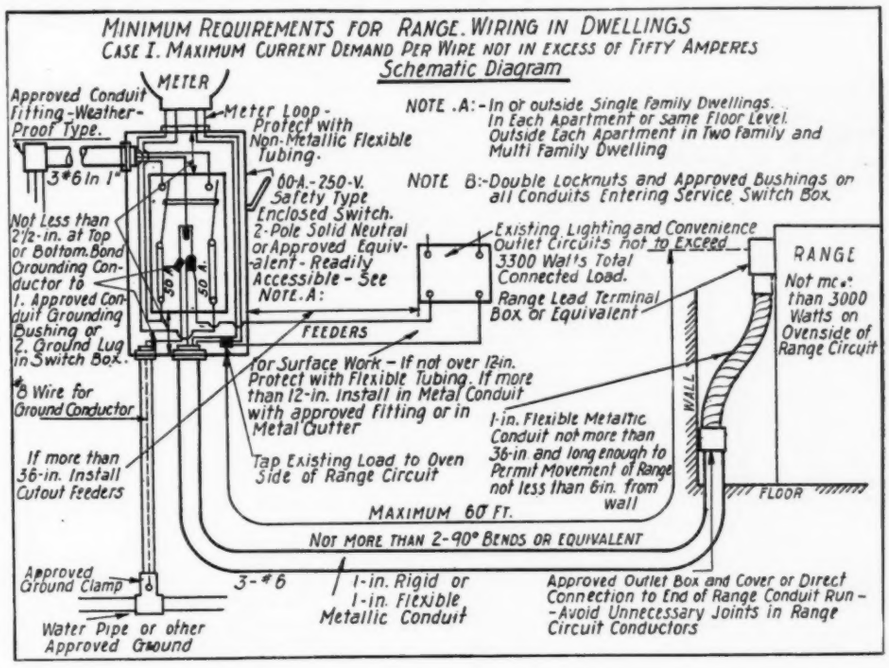
Fig. 2 shows two large transformers in the substation of the Continental Baking Co., New York City, installed by the Knapp Company. Figure 3 is the instrument board in the same substation, made by the New York Edison Company. The Knapp Company did all the conduit and construction work (the high tension conductors are under the concrete floor) and, in fact, everything but the connecting up of the panelboard. Only a few of these boards have ever been installed.

"Special Rules"

(*Continued From Page* 29)

such a standard of inspection. But it is useless to blame the system; it is not to be changed. We must accept it and try by deduction and cooperation to help the inspectors to fill their jobs acceptably. Again we can take pride in our efforts toward this end. We believe that the industry as a whole enjoys higher confidence on the part of the inspectors and officials generally than it has at any time in the past. And we are convinced that this confidence results from a reasonable, human, helpful attitude on our part. It has been a long time since anybody charged us with trying to hinder, and I think our reputation in this regard is a prime asset to the industry.

California Range Wiring Requirements


MINIMUM REQUIREMENTS FOR RANGE WIRING IN DWELLINGS
CASE I. MAXIMUM CURRENT DEMAND PER WIRE NOT IN EXCESS OF FIFTY AMPERES
Schematic Diagram
METER
Approved Conduit Fitting-Weather-Proof Type.
Meter Loop - Protect with Non-Metallic Flexible Tubing.
NOTE .A:- In or outside Single Family Dwellings. In Each Apartment or same Floor Level Outside Each Apartment in Two family and Multi Family Dwelling
NOTE B:-Double Locknuts and Approved Bushings on all Conduits Entering Service Switch Box.
3-#6 In 1"
60-A.-250-V. Safety Type Enclosed Switch. 2-Pole Solid Neutral or Approved Equivalent - Readily Accessible - See NOTE. A:
Not Less than 2 1/2-in. at Top or Bottom. Bond Grounding Conductor to 1. Approved Conduit Grounding Bushing or 2. Ground Lug in Switch Box.
Existing Lighting and Convenience Outlet Circuits not to Exceed 3300 Watts Total Connected Load.
Range Lead Terminal Box or Equivalent
RANGE
Not more than 3000 Watts on Ovenside of Range Circuit
FEEDERS
For Surface Work - If not over 12in. Protect with Flexible Tubing. If more than 12-in. Install in Metal Conduit with approved fitting or in Metal Gutter
#8 Wire for Ground Conductor
If more than 36-in. Install Cutout Feeders
Tap Existing Load to Oven Side of Range Circuit
1-in. Flexible Metallic Conduit not more than 36-in and long enough to Permit Movement of Range not less than 6in. from wall
WALL
FLOOR
MAXIMUM 60 FT.
NOT MORE THAN 2-90° BENDS OR EQUIVALENT
Approved Ground Clamp
3-#6
1-in. Rigid or 1-in. Flexible Metallic Conduit
Approved Outlet Box and Cover or Direct Connection to End of Range Conduit Run - -Avoid Unnecessary Joints in Range Circuit Conductors
Water Pipe or other Approved Ground

FOR the past three years the California Electragists, inspectors and central stations have been discussing a standard for electric range wiring. A minimum has now been approved for the State and a typical layout is shown.

These requirements apply only to already wired buildings which are about to be wired for a range and where the maximum demand per wire is not in excess of 50 amp. In calculating this demand the range circuit is taken at 100 per cent connected load and the other circuits at 80 per cent. The maximum connected load allowed for the lighting and convenience outlet circuits under these requirements is 3300 watts.

Service—Three No. 6 wires in 1-in. conduit provided the run has not more than the equivalent of two 90-deg. bends. Conduit to terminate is not smaller than a 60-amp., 250-volt safety type enclosed switch fused to 50-amp. readily accessible, and within 6 1-2 feet of ground. Meter to be adjacent to switch.

Range Circuit — Conductors to be installed in rigid or flexible conduit or both. At range end use flexible metallic conduit of sufficient length to permit moving of range not less than 6-in. from the wall. Not smaller than three No. 6 wires shall be used which may be installed in 1-in. conduit provided run is not over 60 feet and does not contain equivalent of more than two 90-deg. bends. Where service switch and fuses protect range circuit the switch may be used as range disconnecting switch.

Service Switch Location—May be inside or outside of single family dwelling. For dwellings of two or more families these switches shall be located in each apartment or on same floor level outside each apartment, except that they may be installed outside two-family, one-story dwellings.

Existing Lighting and Convenience Outlet Circuits — Where smaller wires are tapped from range circuit to supply current to existing cutouts they must be protected by a cutout if they exceed 3-ft. Such wires run on the surface, one foot or less in length, may be protected by non-metallic flexible tubing. For longer runs they must be in conduit or metal gutter.

Where taps are made in service switch cabinets, a clearance of at least 2 1-2 in. between switch base and cabinet must be provided on end when splices are made.

Grounding—Neutral to be grounded by not less than No. 8 wire run from neutral terminal on line side of service switch to approved clamp on water pipe or other approved ground. Ground wire to be bonded to conduit grounding bushing or ground lug in service switch box and to be protected by conduit, which may serve as grounding conductor for service conduit and for the range.

Analysis of 1928 Code--II

This chapter of the National Electrical Code Analyses describes rules on boxes, terminals and grounding

Article 7. Boxes, Cabinets, Outlet and Terminal Fittings

Section 701, *Construction of Outlet, Switch, Junction and Pull Boxes and Outlet and Terminal Fittings.*

Rule 701-a. Here, as in several other rules requiring oxidation-preventive treatment of metal, the words "unless of corrosion resistive metal" have been inserted.

701-b and 701-c. It was formerly required that boxes not over 150 cubic inches in size should be made of No. 14 pressed steel or 1-8 inch cast metal, while small boxes larger than 150 cubic inches could be built up of No. 16 steel. The dividing line is now made 100 cubic inches, so that a No. 16 steel box 6 in. by 6 in. by 3 in., can be approved.

Rule 701-i is new.

i. Boxes and fittings intended for outdoor use shall be of approved weatherproof type.

With the above exceptions, there are no changes in the requirements of this section. On account of a re-arrangement of the article separating the material specifications from the installation rules, none of the rule numbers correspond with the old numbers.

Section 702. *Construction of Cabinets and Cutout Boxes.*

702-a requires the protection of metal cabinets and cutout boxes and mentions "plating with cadmium, tin or zinc."

The wording in old Rule 702-h that "composition cabinets shall conform to the requirements for wooden cabinets," is now omitted. (New rule, 702-d).

Other requirements are unchanged.

Section 703. *Installation of Boxes, Cabinets and Outlet and Terminal Fittings.*

Rule 703-a (old 701-m) is made more specific by this wording of the first sentence:

a. At each outlet, switch, or junction point of conduit, metal raceway, armored cable or non-metallic sheathed cable, and at each outlet and switch point of concealed knob and tube work, an approved box shall be installed.

703-b and 703-d are new and are quoted in full as follows:

b. Outlet boxes for concealed work shall have an internal depth of at least 1 1-2 inches, except that where the installation of such a box will result in injury to the building structure, a box of not less than 1-2 inch internal depth may be installed.

d. Approved metal supports shall be used in new work for boxes and fittings which are not secured to a stud, joist, or similar fixed structural unit. Blocks of wood ⅞-inch in thickness may be used for supports if the blocks are rigidly secured to such structural units.

Rule 703-e includes the following new requirement:

Screws for supporting the box (boxes used to enclose flush devices) shall not be used for the attachment of the device contained therein.

Requirements for fastening outlet boxes in place in old Rule 701-i are made to apply specifically to boxes not over 100 cubic inches in size.

The old Rule 701-c required that conduit, raceway or armored cable be secured to boxes, etc. Non-metallic sheathed cable, flexible tubing and open wiring are added to the list in new Rule 703-l, and it is further required that the couplings or bushings shall close the openings adequately.

A new rule, 703-n, requires grounding of boxes and cabinets when specified in Sections 904 and 905. Boxes, cabinets and fittings are considered to be grounded by connection to grounded conduit, cable or raceway.

Article 8. Automatic Protection of Circuits and Appliances

Section 801. *Cutout Boxes,* 802, *Link Fuses and* 803, *Enclosed Fuses,* are, in most respects, identical with the sections of the 1925 Code, having the same numbers.

Rule 801-d is changed to read:

"Fuse terminals . . . shall be of either the Edison plug, spring-clip, knife-blade *or other approved standardized type.*

The new wording in italics is inserted because it is very generally agreed that there is need for a 15 amp. plug fuse which will be non-interchangeable with other fuses, and such a fuse will undoubtedly be approved by the underwriters' laboratories and put on the market as soon as the interests of various inventors can be harmonized.

Old Rule 805-l is transferred to Section 802 as Paragraph d and there is a change in the wording in 803-f specifying the circuits for which plug fuses are approved. The old wording was:

Approved plugs or cartridge fuses in approved casings for Edison plug cutouts not exceeding 125 volts, but including any circuit of a three-wire 125-250 volt system with grounded neutral.

This is now changed to read:

Approved plugs or cartridge fuses in approved casings for Edison plug cutouts not exceeding 125 volts, but including any feeder or circuit of a system having a grounded neutral, if no wire of the feeder or circuit exceeds 125 volts to ground.

It was the intention of the old rule to state the approval of plug fuses for protecting 220-volt two-wire circuits and 110-220 volt three-wire circuits of a grounded neutral three-wire system, but this has not always been clearly understood. The new wording should make the meaning perfectly clear.

New Rules on Automatic Protection

Section 804. *Circuit-breakers and Thermal Cutouts.*

The following rule, 804-c, is new:

An air circuit-breaker of 0-15 ampere capacity, used for branch lighting and appliance circuits, shall be of such a design that any alteration of its trip point (calibration) or in the time required for its operation on over-current will be difficult.

This rule is inserted because of the probability that a satisfactory 15 amp. circuit-breaker will be developed to take the place of fuses for the protection of branch circuits.

New Rules 805-c-2 and 3 provide that for the protection of conductors, time-limit automatic overload protective devices shall operate at not over 110 per cent of the carrying capacities of the conductors; instantaneous circuit breakers shall operate at not over 160 per cent. These requirements are modified for motor circuits.

A new rule, 805-g, states that at locations where the size of wire is changed and overload protection is inserted, a grounded conductor of the circuit may be proportionately reduced in size even though it is solidly connected to the larger wire without protection.

The old rule, 805-o, contained a table giving the number of overload trip coils required for all circuit-breakers. The new rule corresponding to this, 805-p, uses the term "overcurrent units" in place of "trip coils," and is confined to circuit-breakers for circuit protection. This table is reproduced in full. Items 2, 6, 7, 8, 12 and 13 are the same as in the old edition. The remaining items are for the most part in the nature of a further subdivision and elaboration of the requirements, rather than actual changes. (Table A)

Section 806. *Services.*

Section 806 of the old Code is omitted entirely. The rules for automatic overload protection of services are now all included in Article 4, Services, and Article 50, Circuits Operating at More Than 600 Volts.

Section 807. *Lighting and Appliance Branch Circuits.*

The only important change in this section is in Rule 807-g. The old rule (807-i) reads:

On a 2-wire branch circuit and on either side of a 3-wire branch circuit, the number of outlets shall not exceed 12, *except by permission of the inspection department.*

The italicized words are omitted in the new rule and the paragraph is preceded by the words "in general." The following new paragraph is added:

For "Lighting Branch Circuits", "Combination Lighting and Appliance Branch Circuits", and "Appliance Branch Circuits" which do not supply floor areas greater than 1200 square feet per circuit, the above outlet restriction may be waived, provided such circuits do not have connected loads greater than 15 amperes for "lighting branch circuits" nor greater than 10 amperes for "Combination lighting and appliance branch circuits."

It is understood that by connected load is meant fixed load, exclusive of loads which may be connected to appliance outlets.

Section 808. *Motors and Motor Circuits.*

The complete text of this section, including all tables, was published in THE ELECTRAGIST in April, 1927. No changes of any great importance have been made since that date except in a few of the fuse sizes given in Table I, making these conform to the latest commercial standards, and the addition of a table of settings for circuit-breakers used for motor circuit protection.

TABLE A—NUMBER OF OVER-CURRENT UNITS FOR AUTOMATIC CIRCUIT BREAKERS

SYSTEM	*Number and location of Overcurrent Units, such as Fuses, Trip Coils, or Relays.
2-Wire, Single-phase A.C. or D.C. Ungrounded.	One (in either conductor. Place always in conductors connected to same side of the circuit. Fig. 1.)
2-Wire, Single-phase A.C. or D.C., One Wire Grounded.	One (in ungrounded conductor. Fig. 2.)
2-Wire, Single-phase A.C. or D.C., Mid-point Grounded.	Two (one in each conductor. Fig. 3.)
2-Wire, Single-phase A.C. Derived from 3-Phase, with Ungrounded Neutral.	Where a group of feeders is fed from the three phases of a common three-phase bus, each conductor served by either of two conductors of the three-phase bus must be equipped with one overcurrent unit. This will result in some circuits being equipped with one unit and others with two units. Fig. 4.
2-Wire, Single-phase Derived from 3-Phase, Grounded Neutral System by Using Outside Wires of 3-Phase Circuit.	Two (one in each conductor. Fig. 5.)
3-Wire, Single-phase A.C. or D.C., Neutral Grounded or Ungrounded.	Two (one in each conductor except neutral conductor. Fig. 6.)
3-Wire, 2-Phase, A.C., Common Wire Grounded or Ungrounded.	Two (one in each conductor except common conductor. Fig. 7.)
4-Wire, 2-Phase, Ungrounded, Phases Separate.	Two (one in each phase. Place always in conductors connected to same side of the circuit in each phase. Fig. 8.)
4 or 5-Wire, 2-Phase, Neutral Grounded or Ungrounded.	Four (one in each conductor except neutral conductor. Fig. 9.)
3-Wire, 3-Phase, Ungrounded.	a. Three (one in each conductor if the circuit is served by transformers whose primaries are connected in Y and neutral not connected to system or grounded. Fig. 10.) b. Two, under all other conditions. Place always in same phases.
3-Wire, 3-Phase, 1 Wire Grounded.	Two (one in each ungrounded conductor. Fig. 11.)
3-Wire, 3-Phase, Grounded Neutral.	Three (one in each conductor. Fig. 12.)
4-Wire, 3-Phase, Neutral Grounded or Ungrounded.	Three (one in each conductor, except neutral conductor. Fig. 13.)

*1. Where the above table calls for one overload unit, this may consist of one fuse, one series over-current tripping device, or the combination of one current transformer and one secondary over-current tripping device.

2. Where it calls for two overload units, these may consist of two fuses, two series over-current tripping devices, or the combination of two current transformers and two secondary over-current tripping devices.

3. Where it calls for three over-current units, these may consist of three fuses, three series over-current tripping devices, the combination of two or three secondary over-current tripping devices with three current transformers, or two series or secondary over-current tripping devices and one fuse.

4. Where it calls for four over-current units, these may consist of four fuses, four series over-current tripping devices, four current transformers with four secondary over-current tripping devices, or two series or secondary over-current tripping devices with two fuses.

The combinations of fuses with series or secondary over-current tripping devices mentioned under (3) and (4) above are to be discouraged for obvious reasons.

The fuse sizes eliminated and those substituted are as follows:

TABLE 3

Size fuse in original Table-rating in amps.	Size fuse substituted in final table-amps.
5	6
55	50 or 60
65	60 or 70
75	70 or 80
85	80 or 90
95	90 or 100
120	110 or 125
275	250 or 300
325	300 or 350
375	350 or 400

Automatic overload circuit-breakers used for the protection of motor branch circuits must not be set higher than specified in Table 4.

An outline comparison between all the requirements contained in Section 808 and the corresponding requirements in the old rules is presented in Table 5.

Section 809. *Protection of Generators.*

Contains only a reference to Article 10, the same as old Section 810.

TABLE 4—Circuit Breaker

Type of Motor	Circuit-Breaker Setting Per Cent of Motor Full-Load Current: Instantaneous Type	Time-Limit Type
Single-phase, repulsion or split-phase starting	—	250
Squirrel-cage, full-voltage starting	—	250
Squirrel-cage, reduced-voltage starting (not more than 30 amperes)	—	200
Squirrel-cage, reduced-voltage starting (more than 30 amperes)	—	200
High-reactance squirrel-cage (more than 30 amperes)	—	200
Slip-Ring	—	150
Direct-Current (not more than 50 H. P.)	250	150
Direct-Current (more than 50 H. P.)	175	150

Section 810. *Protection of Electrically Heated Appliances.*

Old Rules 811-a and b are omitted and a reference is given to Article 16.

The remainder of this article consists of the old Sections 812, 813, 814 and 815, all of which are included without change.

Article 9. Grounding

Section 901. *General.*

This section contains all the requirements found in the old section, with a few changes, and some new matter.

In Rule 901-a it is explained that:

the temporary currents, which are set up under accidental conditions while the grounding connectors are performing their intended functions, are not to be considered as objectionable.

In the old rule it is stated that grounding to water pipes "should always be permitted;" the new rule states that such grounding "is essential" and that:

In the absence of such a water piping system, a system ground conductor or a secondary neutral grid shall be used if available.

Rule 901-c is new, it merely serves to make the old requirements more easily understood. This rule is as follows:

Where such a water piping system, a system ground conductor, or a secondary neutral grid is not available the grounding connection shall be made in a manner to secure the most suitable ground and, by one of the following methods:

(1) A continuous metallic underground steam piping system;

(2) A continuous metallic underground gas piping system;

(3) The metal frame of the building;

(4) A local metallic underground piping system, metal well casing and the like;

(5) An artificial ground whose electrode consists of driven pipe, driven rod, buried plate, or other devices approved for the purpose.

Rule 901-d states that a driven pipe or rod electrode shall "preferably" be of one piece and recognizes the fact that a pipe or rod cannot be driven to a depth of eight feet if rock is encountered.

901-e corresponds to the old rule of the same number. The requirement of not over 25 ohms resistance for a so-called "artificial ground" is not subject to any exception as was permitted in the old rule. When an artificial ground must be employed, the number of electrodes is determined as follows:

Not more than one is required for lightning arrestors except where for large current capacity. Not more than one is required for conduit, equipment and other non-current carrying parts. Not more than one is required for grounding low-voltage alternating-current distribution circuits where such ground connection constitutes one of a multiplicity of grounds on the same circuit; but otherwise at least two electrodes shall be provided and shall be at least 6 feet apart and at least 6 feet from other grounding electrodes. The combined area in contact with exterior soil shall be not less than four square feet. If the resistance to ground is in excess of 3 ohms the grounding conductor, except in rural districts, shall be protected and guarded by being enclosed in insulating conduit or moulding to protect persons from injury by coming in contact with it.

Section 902. *Grounding for Distribution Systems and Interior Wiring.*

The requirements applying in each case are now separated. In the following Rule 902-c, the first sentence is the same in effect as the old rule. The italics indicate the more important changes in the wording. The second sentence is new.

c. *Secondary* alternating-current *distribution systems* supplying *interior wiring systems* shall be grounded *on one conductor* if they can be so grounded that the maximum voltage to ground does not exceed 150. Similar systems operating with the voltage to ground exceeding 150 volts may be grounded.

Rule 902-d, specifying the method of making ground connection on grounded-secondary A. C. distribution system, is much clearer than the former rule by rewording though the requirements are essentially the same.

Rule 902-g specifies the conductors to be grounded in A. C. interior wiring systems, and is practically the same as old Rule 902-e, with much better wording.

Section 903. *Method of Grounding Circuits.*

Rule 903-a, requiring the grounding connection on an interior wiring system to be made on the line side of the service switch, includes the following new sentence:

It shall always be made upon the identified wire, commonly known as "the white wire."

TABLE 5—Comparison between new and old rules for the automatic overload protection of motor branch circuit conductors and motors.

Rule	New	Rule	Old
808-a	Complete tables of wire and fuse sizes for all types and sizes of motors.	808-c	Circuit fuses must carry starting current. Size wire determined from fuse size. For A. C Motors with large starting current, Column C of Table I, Section 610, may be used.
		809-b-1	Motor fuses not over 125 per cent of motor rating.
		809-b 6 and 8	Settings specified for motor protection relays and circuit-breakers.
808-a-5	Where motor protection is thermal cutouts or relays and sizes do not correspond to table, next larger standard size approved.	809-b-3	Rating of thermal cutouts to be 125 per cent of full load, or if this is not standard size, next larger size approved.
808-a-5 (1)	Motors of 2 h. p. or less may have specified circuit protection only.	809-a	Same
808-a-5 (2)	Two or more motors may be protected by 15 amp. circuit fuses if circuit wattage does not exceed 1320 and full load current of any one motor does not exceed 6 amps.	809-b	Same, except requirement of not over 6 amp. for any one motor not included.
808-a-5 (3)	If a tap from a main to motor protection device is same size as main, no protection device required at point of tap.		Not covered by a specific rule, but in accordance with general rules for protection of circuits.
	If a tap is 1/3 size of main, tap is not over 25 ft. long, and protected from mechanical injury, no protective device required at point of tap.	809-b	Same
	In two cases above, if motor protection is thermal cutouts, fuses of proper size required to protect mains.	809-b-5	Same
808-a-5 (5)	Except when thermal cutouts are used for motor protection, motor circuit protection may be a circuit-breaker. Settings specified.	808-d	Circuit-breaker shall not be set over 30 per cent above carrying capacity of wire.
808-a-5 (6)	Specifications for number of trip coils, relays or thermal cutouts for motor protection.	805-o	Specifications for number of trip coils for all circuit-breakers.
808-c	Carrying capacity of conductors from slip rings to controller and from controller to resistor.		No rule
808-b	Short time duty motors: Motor circuit conductors to be different from sizes in Table 808-a. Motors sufficiently protected by branch circuit protection.	809a	Same
808-d	Fuses not required in series with other types of protection, except thermal cutouts, when: (a) Others are on main switchboards. (b) Others are under competent supervision. (c) Next back on line there are fuses or time-limit breakers set at 500 per cent of motor rating. (d) Next back on line there is an instantaneous breaker set at 700 per cent of motor rating.	809-b-7	(a) Same (b) Same (c) Fuses or any circuit-breaker set at not over 300 per cent of motor rating. (d) When largest size approved enclosed fuses are too small.
805-o	Circuit breaker shall have one pole in each ungrounded conductor. No exception for motors.	809-b-9	Two single-pole breakers or one single-pole breaker and one fuse may be used to protect D. C. and single-phase motors.
808-e	Protective devices other than fuses to have carrying capacity at least 115 per cent of motor rating.	809-b-6	Overload relay, 110 per cent of motor rating.
		809-b-8	Circuit-breaker, 110 per cent of motor rating.

The old section, numbered 903, on ground connection for lightning arrestors and ground detectors, is omitted.

Section 904. Grounding for Metal Enclosures, Coverings and Fixed Equipment.

This section and the one following now replace the single Section 904 in the former edition. Section 904 is confined chiefly to specifying what equipment shall be grounded.

Rule 904-a requires the grounding of "exposed non-current carrying metal parts of fixed equipment, such as—." First in the list of examples are the frames of generators and motors; these must be grounded under all conditions, without any exceptions. Old Rule 1001-a required the grounding of frames of rotating machinery if operating at over 150 volts and accessible to other than qualified persons; under other conditions if not grounded the frames were required to be insulated from ground.

Transformers are next mentioned, and the cases must always be grounded. This is the same as the old requirement (old Rule 1102-d). Controllers are included in this list and must always have their cases or frames grounded; no rule in the old Code requires this. Exposed parts of fixed appliances must be grounded in all cases; under old Rule 1603-b the frames of electrically heated appliances on circuits above 150 volts to ground, had to be grounded unless the inspection department decided that grounding was impracticable. There was no mention of the grounding of other types of fixed appliances in the old rules.

Fixtures are mentioned in this rule but to get the whole story on fixtures it is necessary to turn to Section 14. Rule 1403-a requires grounding of all fixtures on circuits above 150 volts to ground, and all fixtures used with conduit, armored cable, or metal raceway, except when the conduit, cable or raceway is itself not grounded. Fixtures used with knob and tube work, non-metallic sheathed cable or wood molding need not be grounded (Rule 1403-b) if not mounted on ceilings or walls of metal or metal lath, or if mounted on such ceilings or walls and properly insulated therefrom. The changes here are: First, requiring grounding of all fixtures on circuits of over 150 volts to ground; and, second, requiring grounding when the circuit wires are in grounded conduit, raceway or armored cable.

Next and final in the list of items of fixed equipment to be grounded are conduit, armor of cable, metal raceway "and the like." Lined covers of surface-type snap switches and lined shells of standard sockets are excepted as not required to be grounded under any conditions. In Rule 904-b, certain of these items are excepted, provided: (a) The voltage of contained conductors does not exceed 150 volts to ground and (b) the contained conductors are on grounded circuits or on circuits unexposed to voltages above 150 to ground, and (c) the installation is not in an industrial establishment, and (d) the installation is not in a moist, corrosive, hazardous, extra hazardous or conductive location. The items which, under the above conditions, need not be grounded are:

(1) Service runs of conduit, under the further conditions stated in Section 404, paragraph f, of article 4.

(2) Runs of less than 25 feet of conduit, armor of cable, metal raceways, etc., when these runs are free from metallic contact with the ground and from adjacent grounded metal and are guarded when within reach from grounded surfaces.

(3) Boxes, cabinets, outlet and terminal fittings.

(4) Objects exempted from grounding by other rules of this Code.

Conductive Locations are defined as

(1) Any room, all or part of which is below normal ground level.

TABLE 5—(Continued)

Rule	New	Rule	Old
808-f	Overload release operative during starting on D. C. motor approved for motor running protection.	809-d	Same
808-g	Controller for A. C. motor approved for motor running protection under specified conditions.	809-e	Same
808-h	With motor protection cut out during starting, motor and circuit considered protected if next back on line. Fuses or time-limit breaker set at 500 per cent of motor rating. Instantaneous breaker set at 700 per cent of motor rating.	808-e 809-f	Fuse or any circuit breaker set at not over 500 per eent of motor rating.
808-i	Switch shunting motor running protection to be of type that cannot be left in starting position.	809-g	Same
808-j	Control circuits of a magnetic controller may be protected only by motor protection if protected from mechanical injury and not extended beyond machine.	808-f	Same
808-k	Demand factor may be used by special permission.		No corresponding rule

(2) Laundries, kitchens, bath rooms.
(3) Ground floors of garages, stables and outbuildings with earth or concrete floors.
(4) Rooms having floors, walls, or ceilings containing metal lath, metal reinforcement or metal covering.
(5) Any particular location so designated by the authority having jurisdiction.

These requirements for items (1) and (2) should be compared with the old Rules 503-h and 955-l, exempting from grounding requirements service conduits and short isolated lengths of conduit, armored cable and raceway. Provisions (a), (b) and (c) above are entirely new. The invariable requirement for grounding service conduit and isolated lengths of conduit, cable armor and raceway in moist, corrosive, hazardous and extra hazardous locations is new.

The specific mention of boxes, cabinets, outlet and terminal fittings, clearly includes these items as types of equipment which must be grounded where the exceptions do not apply.

Old Rule 905-l did in effect require the grounding of boxes, cabinets and outlet and terminal fittings when used in any metal-enclosed type of wiring. Perhaps the most important feature of this entire section is the fact that it requires outlet and terminal fittings in knob and tube wiring to be grounded in "conductive" locations; common instances being bath rooms, kitchens, laundries and basements.

It is interesting to note that when the wiring is knob and tube or sheathed cable an outlet box in a bath room must be grounded but a fixture attached to the outlet box need not be grounded if anyone wishes to go to the expense of providing an insulating joint and canopy insulator.

Section 905. *Method of Grounding Metal Enclosures, Coverings and Fixed Equipment.*

The section begins with a new note as follows:

For the purpose of this section, fixed equipment devices and appliances shall include all motors, heaters, ranges, fixtures, pendant sockets and all other similar devices which have a metallic exterior and which are connected to the circuit by permanent wires, i. e., without attachment plugs.

The first sentence of Rule 905-a is a repetition of the old 904-c, forbidding the use of any portion of the house conduit as a part of the grounding conductor for the service conduit, with the added provision that no portion of the service switch box be interposed in the grounding circuit. An exception is permitted as follows:

Where the service switch box or house conduit is grounded, and is installed in dry, non-corrosive locations, the service switch box may be interposed in the grounding circuit of the service conduit provided that bonding jumpers or ground clamps or lugs or devices approved for the purpose are used.

Under old Rule 905-e a common grounding conductor for the system ground and service equipment ground could be used only by permission of the inspection department. Under the present 905-e the common grounding conductor may be employed:

provided that the system is grounded at two or more locations not in the same building to a continuous metallic underground piping system.

Where artificial grounds are used the system ground and equipment ground must each have a separate electrode.

The following rule, 905-d, is entirely new:

d. Metal enclosures and coverings for conductors, and separate grounding wires run in wire assemblies with the circuit conductors, are considered as suitable grounding conductors for protective grounding of fixed equipment, devices and appliances, when installed and used in compliance with the requirements of Article 5 of this Code.

Section 906. *Grounding Conductors.*

Rule 906-a:

a. The conductor for grounding a copper conductor of an interior wiring system shall be of copper and shall be without joint or splice. The conductor for grounding conduit, equipment and other non-current carrying parts may be of copper, or may be a metal pipe or rigid electric conduit, except that under conditions favorable to corrosion, copper only shall be used.

The corresponding old rule, 905-a, made no distinction between conductors for a system ground and for an equipment ground, and stated that either might be of copper or other metal which would not corrode readily and "where practicable" should be without joint or splice.

Rule 906-b is entirely new.

b. On all service-entrance conduit and where an interior wiring system operates at over 150 volts to ground and pipe, conduit or raceway is used as the grounding conductor for fixed equipment, conduits, raceways and fittings, approved bonding jumpers, or other approved devices shall be used. Such bonding jumpers shall not be required with properly cleaned threaded joints, made up tight, on pipe, conduit or fittings, nor, except for service conduit, when approved threadless joints made up tight on pipe, conduit or fittings, or when two lock-nuts are used.

This rule applies particularly to power work. Effective grounding of equipment is particularly important in wiring for 2-phase or 3-phase systems with a voltage of 220 volts or higher. Under this rule the grounding in such cases will be made more effective and more nearly permanent by the required use of jumpers around boxes and cabinets to bond the conduit runs together, or the use of two locknuts and a bushing for attaching conduits to boxes.

Rule 906-c.

c. No automatic cutout, or switch for interior wiring systems shall be placed in a grounding conductor, unless the opening of the cutout or switch disconnects all sources of energy.

Old Rule 905-b, corresponding to the above, did not include switches. The wording was such that an automatic cutout in a system grounding conductor was prohibited without any exception, but was permitted in a grounding conductor from equipment where its operation would disconnect the circuit leads from all sources of energy.

Rule 906-d now requires that the installation of a system grounding conductor, *when not consisting of* or enclosed in metallic piping, and the insulation of the conductor, shall comply with all requirements of the Code, etc. The words in italics are new, otherwise there is no essential change from the old 905-c.

Rule 906-e is in effect the same as old 905-d, except that all grounding wires smaller than No. 4 within five feet of the floor must be protected from mechanical injury. The old rule states that such wires must be placed where they were not liable to be damaged, or must be protected.

Rule 906-h on the size of grounding conductors for A. C. system grounds omits the clause in old Rule 905-h "and it need not be larger than No. 0."

In the old Code the required size of a grounding conductor for a service conduit was the same as for any other conduit containing wires of the same size. Special requirements are now set up for service conduits because under certain conditions—for example, an accidental ground of a normally ungrounded service wire on the outer end of the service conduit—the conduit and its grounding wire may be called upon to carry a very heavy current and the primary fuses constitute the only protection for the circuit.

The new rule, 906-j, is as follows:

j. For grounding service conduit of size not larger than 1½ inches, the grounding wire shall be not smaller than No. 8; for two-inch conduit the grounding wire shall be not smaller than No. 4; for larger conduits not smaller than No. 2.

The old Rule 905-j is retained (new Rule 906-k) with the new provision that when the capacity of the nearest cutout protecting the circuit conductors is 0-30 amps. the size of wire used for grounding the metal enclosure of the circuit conductors shall be not less than two sizes smaller than that of the circuit conductors. No. 10 was formerly the smallest size permitted.

Rule 906-l, covering grounding conductors for portable or pendant equipment, is the same as the last paragraph of old 905-j, except for a new sentence reading:

For grounding fixtures No. 14 or larger shall be used, except that a smaller wire may be permitted for the grounding conductor of non-metallic sheathed cable.

Rules 507-d and 611-b state that non-metallic sheathed cable in 2-wire and 3-wire assemblies shall have an approved size of non-insulated wire laid in next to the insulated conductors for grounding purposes. According to 906-k this grounding conductor may be No. 16.

The reason for this new rule is obvious:

906-m. The grounding conductors for circuits, conduit, equipment, and the like shall not be connected to lightning rods.

In grounding instruments, meters or relays a number of changes are made in the requirements of old Rule 905-k (new Rule 906-n). Under the same conditions as formerly specified, grounding of cases is required when the voltage to ground in the winding is 300 volts or more, instead of 150 volts, as in the old rule. Where operated from current or potential transformers, *on circuits of 300 volts or more to ground, having ungrounded secondary circuits and ungrounded primary circuits*, the cases, etc., must be grounded. The italics indicate new wording.

The last two sentences of old 905-k are omitted. This portion of the old rule covered requirements for isolating or grounding the secondaries of current and potential transformers. There are no similar requirements in the new edition.

Rule 906-o, as follows, is new:

o. Secondaries of current and potential instrument transformers and the cases of instruments connected to such circuits shall, when grounded, have separate grounding conductors, and shall not be connected with a grounding conductor used for other circuits or for conduit, equipment and the like, except where a general ground bus is provided.

Section 907. Grounding Connections

This section follows the old Section 906 very closely.

Under old 906-c a ground connection to water piping was required to be on the street side of the water meter except a ground for equipment only, or where the ground formed part of a multiple ground on an A. C. system. Any ground connection may now be made on the house side of the water meter (907-c).

A gas piping system may be used as the ground electrode for both system and equipment grounds when water piping is not available (Rule 907-e). Formerly this use of gas piping was restricted to equipment grounds only. Where gas piping is utilized for grounding small fixtures as permitted in both the new and old rule, if no water piping is available a jumper must be installed around the gas meter. Except in the case of grounding small fixtures, a ground connection to gas piping must be on the street side of the meter.

The following new clause is added to the old Rule 906-f:

and in no case shall such rails or other grounded conductors of railway circuits be used for grounding electrode for interior wiring systems other than those supplied from the railway circuit itself.

Section 908. *Method of Grounding Portable Equipment in Industrial Establishments.*

On account of the risk which has become evident in connection with the wide use of portable motor-driven tools and other equipment in industrial plants and the insistent demands of state commissions for Code rules which will protect users of this equipment, this section, which is entirely new, has been inserted. The section is quoted here in full:

For the purpose of this section an industrial establishment is defined as a building or part of a building (other than office or exhibit space) where persons are employed in manufacturing processes or material handling as distinguished from dwellings, offices, public utilities and like occupancies.

a. In industrial establishments portable devices having exposed metal parts used in industrial operations shall

(1) be equipped with a cord containing an additional insulated conductor to be used for grounding purposes only and easily distinguishable from the circuit conductors, or with metal armor such as type CA, PA, etc.;

(2) be equipped with non-reversible polarized attachment plug properly fastened to the terminals of the cord;

(3) have the grounding conductor (wire or metal armor) connected to the frame or casing of the appliance and to the grounding pole of the plug, and

(4) shall have the grounding pole of the receptacle grounded as required in this article.

Appliances to which this rule applies are those which are electrically operated or motor-driven, and are of a portable nature, such as drills, grinders, glue pots, heaters, soldering irons, pumps, air compressors, hammers, conveyors, elevators, hand and stand lamps, and other similar portable hand tools and devices. Exempted are fan motors, pressing irons, and those appliances which are so located as to be ordinarily out of reach, infrequently handled during manufacturing operations or regularly employed in non-conductive locations.

The use of portable devices on circuits operating in excess of 300 volts to ground, is not recommended.

Definition of Merchandising Principles Approved

Joint Trade Conference Agrees on Declaration of General Principles

FOR more than a year the Joint Trades Conference has been preparing a definition of general merchandising principles for guidance of members. The tentative plan has finally been approved and signed by the following: Lew Hahn, managing director, National Dry Goods Association; Herbert P. Sheets, managing director, National Retail Hardware Dealers' Association; Laurence W. Davis, general manager, A. E. I.; R. R. Rau, secretary National Retail Furniture Association; George A. Fernley, secretary-treasurer, National Hardware Assoc. of the U. S.; Samuel C. Henry, secretary National Association of Retail Druggists.

The definition follows:

"Since the efforts of the power companies form the only continuous means of promoting the sale of electrical appliances, we believe the best interests of manufacturer, dealer and consumer require the continuance of the merchandising activities of power companies, and that the following general principles should be observed.

"1. All discussions of the problems of the relations of power companies and dealers selling electrical appliances must be based upon proper and adequate service to the ultimate consumer.

"2. There should be a segregation of the accounting of the merchandising departments of power companies from their public utility functions and all items of expense incurred in the merchandising of appliances should be charged to the merchandising activities.

"3. It is recognized, however, that expenses incurred in the pioneering of appliances which have not yet met with sufficient public acceptance to be merchandise items in the stocks of local progressive dealers, and general advertising for the development of the market for appliance service, should properly be charged to the promotion accounts of the power companies and not charged to merchandising.

"4. This conference recommends to power companies and independent dealers the necessity of constructive cooperation in their local fields for the better development of the electrical appliance business."

In the carrying out of the general merchandising principles the N. E. L. A. has developed suggested merchandising standards which will be submitted to association members. This follows:

"1. The general sale of electric devices at margins commensurate with the cost of selling, is the only sound merchandise practice, and is conducive to constructive building in the appliance merchandising field.

"2. When combination sales are advisable, adequate margins should govern selling prices. Only the "true value" of articles should be stated in the advertising.

"3. Deferred payments in connection with the sale of all merchandise is universal practice, and is accepted by sound financial authority and favored by the public. A period not exceeding eighteen (18) months is recommended as maximum time allowance for load-building devices in the pioneering stage; and a period not exceeding fifteen (15) months for financing motor-driven devices having general public acceptance. Relatively shorter terms, on a self-supporting basis, should be extended on items selling for less than $25.00. A carrying charge for financing service should be made in all cases, and an initial payment be required large enough to constitute a sale.

"4. The power company is in the merchandising business for the promotion of devices which constitute a medium of electric service. There are kindred lines to merchandise, which are naturally used in conjunction with the appliances, but we suggest it is not desirable for the merchandising department of the power company to engage generally in the direct sale of non-electric devices.

"5. We recommend an adequate classification of Merchandising Accounts by our association."

Eight Towns Standardize Special Requirements

Neighboring Massachusetts Towns Decide on Uniform Set of Special Rules

EIGHT Massachusetts towns near Boston have adopted uniform special requirements. These towns are Arlington, Brookline, Framingham, Lexington, Newton, Somerville, Watertown and Waltham. This action is in line with a widespread desire to cut down manufacturing costs by eliminating many special orders which resulted from varying local requirements. The set of rules decided on are printed below.

Separate boxes required for service and meter switches and cut-out cabinet. Combination boxes not approved.

Service conduit must extend to point of attachment of overhead wires to buildings, and on dwellings at least to top of second story windows.

Service wires must not be smaller than No. 6 B. & S. gauge.

Service wires for 550 volts must be lead covered. Armored cable not approved for 550 volts.

Service switches must be of an approved type and located at immediate point of entrance at cellar window, door, or in an emergency box outside.

Service ground wires must not be smaller than No. 8 wire and run in conduit from service switch to within 4 inches of the water pipe and bonded on street side of shut-off. Ground pipe must be 1-2 inch pipe or larger and bonded separately.

Cabinets for entrance switches, meter switches and cut-outs must be double dipped galvanized, sherardized, electro-galvanized or a similar process. When electro-galvanized material is used the minimum thickness must be 3/1000 of an inch.

In a block, up to and including four stores, the service mains of three No. 6 wires shall continue through store. In cases where there are more than four stores in a block, the inspector of wires shall be consulted in regard to construction.

Where posts on buildings are necessary for attachment of service wires the dimensions shall not be less than four inches by six inches. Posts to be of hard pine, painted and securely attached to buildings.

Where pole is used to carry wires from the street, it must not be smaller than eleven inches at butt and six inches at top. Pole must be of hard pine or other suitable material satisfactory to the inspector of wires. Pole must be set at least five (5) feet in ground and hole left open until approved by the inspector of wires. No pole shall be set until approved by the inspector of wires, and if required, must be cemented.

Garages

Drop cords not approved in garages within reach of floor, must have keyless sockets.

Lights on side walls not approved.

All garages must be on separate circuits and lights controlled by a switch or switches.

Lights in a garage under a house may be taken from house circuit.

General Rules

All wires in garages, basements, cellars, coal sheds, and dry sheds shall be run in galvanized conduit.

Concealed wiring must be either armored cable or galvanized conduit construction.

Conduit sizes as printed in N. E. Code must be followed.

Armored cable must not be used for concealed additional wiring in buildings having knob and tube construction; unless the inspector of wires can be assured that no portion of the original wiring has been made unsafe by the use of such armored cable.

All splices must be made, soldered, compounded, and taped, leaving only the proper wires to be connected to the fixtures, switches and receptacles before rough wiring will be approved.

Approved galvanized outlet boxes must be used on all new work, with the fixtures hung from the center stud and squeeze connectors must be used on armored cable.

Ferrules must be used on end of all armored cables, in all switch boxes and receptacles.

No cabinet shall be installed so that gravity will open the door.

Ground clamps shall not be less than No. 16 B. & S. gauge.

Snap switches with metal covers installed with metal construction must not be used.

No open jack-knife switches to be used. Enclosed externally operated switches required.

Outside lights must be controlled by a switch.

Three-wire branch tap circuits not approved.

Solid neutral fuse required in all three-wire mains and sub-mains.

Nothing smaller than No. 10 wire to be used for sub-mains and meter loops.

All wires run underground must be twin wire, lead covered, and in conduit. No. B. X. L. shall be used for this purpose unless run in pipe.

Junction boxes imbedded in concrete must not be less than three inches deep.

Receptacles must be of pin plug type.

Porcelain sockets must be used in cellars, over cement floors and outside fixtures.

Signs must be on separate circuits and wiring run in conduit.

Ten 50-watt lamps and four convenience outlets are allowed on one circuit.

All bathroom and toilet lights must be switched, and all keyless sockets used.

No fixtures other than kitchen units shall be allowed in either kitchen or laundry unless separate receptacles have been installed for heating purposes.

Galvanized outlet plates may be used on all old work.

All bell wires shall be rubber covered wire and kept free from all piping or armored cable.

All motors shall be controlled by an enclosed switch, the handle of which shall be externally operated.

All motor frames or frames of rectifiers shall be grounded.

Mains for motors of one horse power or over shall not be smaller than No. 10 B. & S. gauge wire.

All three-phase wiring must be in rigid conduit.

Receptacles in kitchens and laundries must be on a separate circuit.

Bath and dining room receptacles may be on the same circuit.

Twisted lamp cord shall not be used for either drop or portable cords.

Window lighting must be on separate circuits and operated by switches.

Store meters in private cellars must have a separate sub-main to each meter switch, fused where taps go from mains to meter.

Where heater and oil-burning controls are used directly from the circuit cut-out, wires must be in armored cable or conduit. The wire shall not be smaller than No. 14 B. & S. gauge terminating at an outlet box satisfactory to the local inspector. Where the transformer is protected by a one to three amp. fuse on a separate cut-out, the secondary wires must not be smaller than No. 18 gauge, rubber covered, and laid together under one braid.

Any self-contained unit not using over 1/6 horse power may be used from a base or wall plug, adjacent to the device.

All motors over 1/6 horse power must have a separate circuit.

The wires for heating appliances consuming more than 1,320 watts must be run in iron conduit.

There must be a junction box attached to each range to which the iron conduit will connect if the range is secured to the floor. If the range is not secured, the conduit must run six inches above the floor, using flexible metal tubing from there to the junction box on the range.

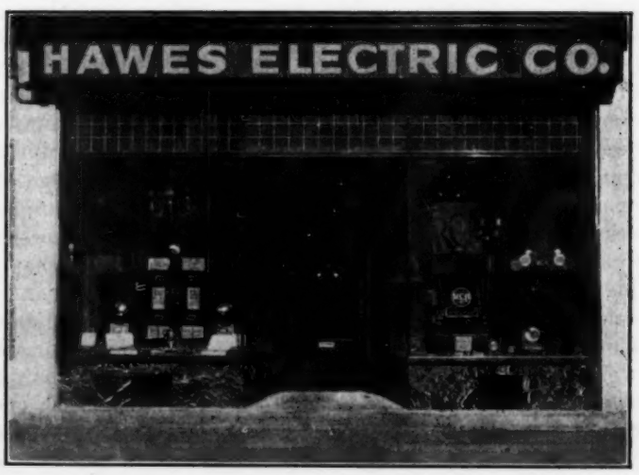
Bell transformers must be inside a cabinet or mounted on the side of a cabinet away from the woodwork.

Bell transformers shall be on a separate circuit and not fused over three amps.

If radio apparatus is to be operated from 110 volt current, it shall have a separate circuit.

Hawes Electric Company

THE new store of the Hawes Electric Co., Watertown, Mass., is a big change from the first shop of Otis Hawes, in the cellar of his home, opened in 1918. Two large, well lighted display windows on either side of the entrance are set off by copper window frames and a marble base.



When the Contractor Designs His Own Building

A Small Building Planned Especially for a Contracting Business Has Many Interesting Features

By GEORGE ANDRAE
General Manager, Herman Andrae Electrical Company

CONTRACTORS contemplating the construction of buildings to house their businesses may be interested in our office and shop which was planned especially for an electrical contracting business. While we do not consider that this is an absolutely ideal layout, it has proved very satisfactory for its purpose and may give some ideas to other contractors.

Front View of Shop

Our building is not a particularly large one, although provision was made for the expansion of the business, and since we do not operate a store it is located at a distance from the business section of Milwaukee, where cost of land is much lower and where rapid deliveries of supplies and service can be made to all sections of the city.

The Herman Andrae Electrical Company, now at 2040 Clybourn Street, Milwaukee, Wis., about three years ago decided to give up its large downtown retail electrical store and restrict its activities almost entirely to contracting as we had done for almost 35 years before hearing the siren call of the electrical appliance and retail store idea.

The first question to consider was that of location. As contractors, we did not need to be downtown. With work scattered all over the city and suburbs, any location, within reason, would in the grand average prove as close as any other to our jobs. We selected a site one and a half miles from downtown, on a direct auto and street car route leading to four electric supply jobbers, two electric express depots, two freight depots, two boat docks, and the post office—all without crossing the crowded downtown section. This place is also located close to the main auto highway west out of the city, as well as being within six blocks each way of two arterial highways north and south through town to facilitate rush calls within the city. Manifestly, this location had definite advantages for an electrical contractor wanting to be in a position to give prompt service on repair calls to any part of the city. Our judgment in this matter has been vindicated many times over, and in three years the property has increased in value appreciably.

We do not have a retail store, appliance show room, or fixture display room. Our entire floor space is devoted to office, stockroom and shop. Going up a few easy steps we enter the front door at "A," and find ourselves in the lobby, a space of about ten by fifteen feet furnished with pictures, carpet, magazines and three wicker chairs for callers. Spaces 1, 2, 3 and 4 on the accompanying diagram are separated from one another by floor-to-ceiling partitions of which the lower section is wood, the middle section unclear glass, and the upper part clear glass. Space 2 is the office of Herman Andrae, president of the company. Space 3 is occupied by George Andrae, who is in charge of the active management of the business. At his desk are push buttons to summon men from the office, repair shop, stockroom or estimating room. At his side are memorandum hooks individually marked for each foreman or salesman, so that upon returning to the office or calling in on the phone, each one can ascertain what messages have come in for him since his last check-up. Space 4 is the estimating room with two desks, two large tables for blue prints, an adding machine, a catalog filing case, and up in the air a large pigeonhole storage rack for blue prints of jobs in progress.

The general office is indicated by space 5, with three very large windows along the west, a low railing along the east, and a built-in fireproof concrete vault (space 7) to the north. This vault is an integral part of the office, as all files for invoices, repair orders, contracts, correspondence, etc., are left in the vault permanently, and at the close of the working day one merely has to close the vault door and all is done. No carrying in and out of files and records every day is necessary. Certain ledgers, active repair orders and contract files are placed on a two-shelf wagon with large rubber tired wheels, and rolled out each morning for ready reference. The stenographer, who also handles the switchboard, is right at the information window and cash drawer to greet callers or to take whatever payments may be made at the office in person. She is located in the lower left hand corner of space 5, with a swivel chair to turn from typewriter to switchboard, cashier's desk, or information window as required.

Space 6, in addition to four desks for salesmen, has a motor stock arranged in rows on the floor. There are also a dozen chain pendants with different types of commercial glass units; a dozen more pendants with various styles of steel industrial reflectors, as well as representative types of four different makes of mirrored window reflectors. Incidentally, it might be mentioned here that below the right half of space 6 is the only basement of the building, and this is just large enough for a boiler with oil burner and a motor-generator set for making direct

current for shop testing. Spaces 9, 10, 11, 12 and 14 provide wardrobe and toilet facilities, while 8 is a storage room for stationery, old blue prints and miscellaneous office supplies.

At "B" we have the side entrance for the electricians, bringing them into space 13, on both sides of which are steel lockers for their use. At one end is a door to the office, ahead is the repair shop, and left the stock room counter. Handy to this counter are two dozen bins, alphabetically listed, for holding small orders made ready to be called for. No goods are issued without a requisition, and for convenience we have three requisition machines: one at the foreman's desk in the office, one on the stockroom counter, and one at the telephone for the stockman to write phone orders directly on the machine without recopying. The goods in the stockroom bins are placed, so far as practicable, with those in most demand closest to the front counter, to save steps. The stockroom ceiling is high enough to have a mezzanine floor over the bins, and up here are kept the slow moving items, miscellaneous old repair parts, odd cabinets, etc., handy, but still out of the way. Along the east wall under the windows are bins for all of the common sizes of rubber covered wire. To one side in front is space 17 which serves as a tool room for properly storing stocks and dies, vises, large wrenches, boring machines, etc.

The repair shop, designated as space 16, has good light and air from a row of large windows along the entire west wall over the work bench. There is the usual shop equipment of lathe, drill presses, dipping tank, bake oven, coil winder, coil spreader, insulation testing apparatus, as well as load-test equipment. In addition there is, at 19, a small spraying room for finishing of fixtures assembled or made up specially for certain jobs in our shop.

Space 21 is very important because everything delivered to the building, whether new goods or returns from a job, must be checked in here before being taken into the stockroom or the shop. New goods upon arrival are checked against the stockroom copy of the purchase order, whereas material returned from jobs in progress is listed item for item on a return material pink sheet on a requisition machine, to be credited back to the job in question. Bins are provided so that returns will not get mixed up, with the result that job credits and billing would be in error. As shown on the plan layout, there is a trolley eye-beam in space 21 projecting through door C out over the driveway to lift motors off of delivery trucks. Door D opens on to the rear space for parking or backing around. There are four garage spaces. Numbers 2 and 3 house the two trucks, while 1 holds tool boxes, large reels, ladders, etc. Space 4 has racks partitioned off on the upper part of the side walls, to keep half-inch conduit from getting too intimate with its one-inch and two-inch cousins, and especially to keep the white and black contingents within their proper spheres. Any conduit delivered by jobber's truck can be unloaded directly into garage No. 4, and later taken out as required on to our truck without dragging this heavy material in and out of the stockroom. Along the rear brick wall from door D to the garage, are hung on racks several long sections of extension ladders, these being chained and padlocked to the brick wall. Incidentally, it might be mentioned that all ladders and tool boxes are painted a certain color which we have adopted, and are also branded in several places with a hot branding iron bearing our firm name.

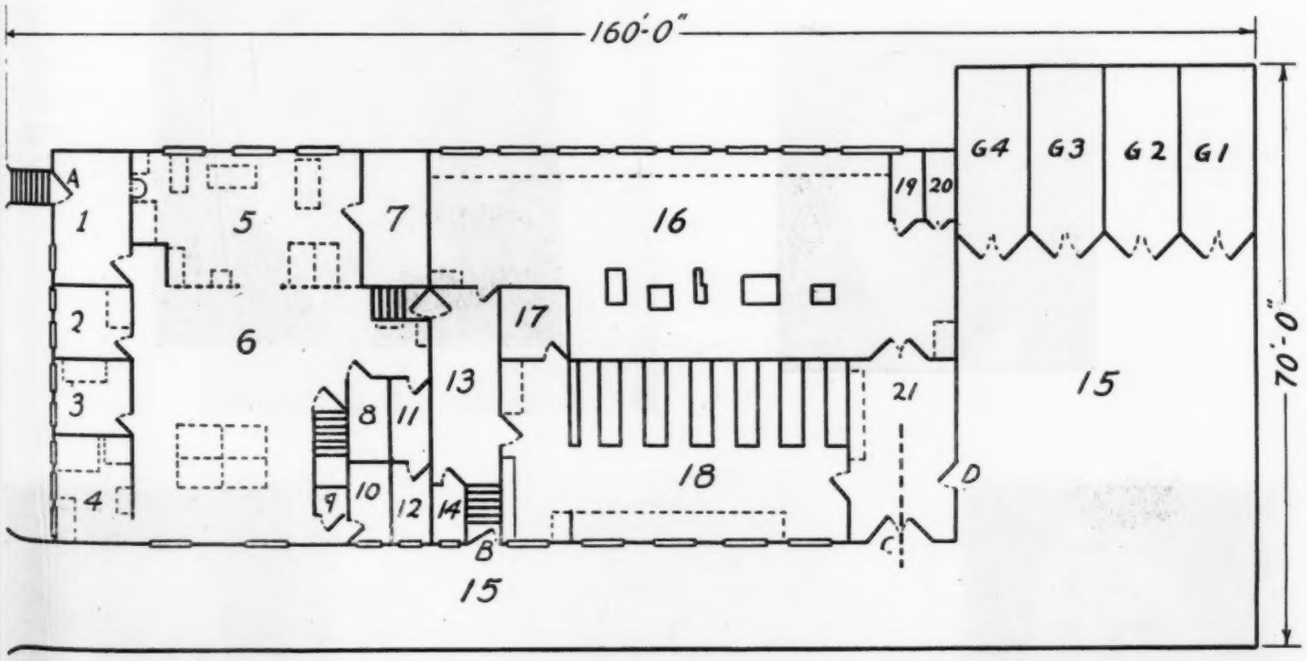


Diagram of Shop Layout

1—Lobby
2—Private Office
3—Private Office
4—Estimating Room
5—General Office
6—Foremen, Motor Stock
7—Vault
8—Office Supplies
9—Wardrobe
10—Toilet
11—Ladies' Cloak Room
12—Toilet
13—Electricians' Entrance
14—Toilet
15—Driveway
16—Motor and Fixture Shop
17—Tool Room
18—Stock Room
19—Spraying Room
20—Bake Oven
21—Receiving and Shipping Room

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JOHN F. GILCHRIST
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Commonwealth Edison Co.

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—Moffet Studio

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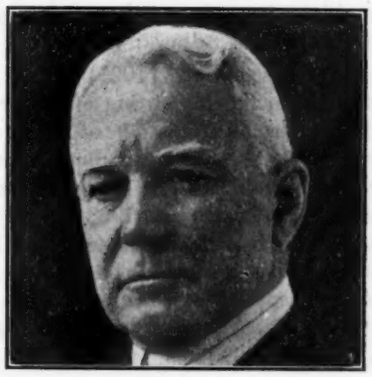

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Chicago, Ill.

—*Blank and Stoller.*

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Chats on the National Electrical Code

A Monthly Discussion of Wiring Practice and Questions of Interpretation, Presented with a View Toward Encouraging a Better Understanding of the Industry's Most Important Set of Rules

Conducted by F. N. M. SQUIRES
Assistant Chief Inspector, N. Y. Board of Fire Underwriters

Supporting Armored Cable

This question was sent recently to the writer: "Can you furnish information about fastening armored cable, as to whether nails, staples or two-hole clips should be used?" and the answer was given about as follows:

"The present Code (1925) makes no reference to the supporting of armored cable, with the exception of the provision in 505-c, wherein it requires that 'the entire cable system being securely fastened in place.' The 1928 Code will qualify this by changing it to read 'The entire cable system shall be secured in place by approved fastenings.'

"The present ruling has been interpreted by inspection departments in various ways and a good many inspectors are requiring the two-hole clips or straps.

"To the question in one of the Bulletins of the Eastern Association of Electrical Inspectors, 'Do you insist on straps for securing?' there were received from the active members 32 'No' and 35 'Yes' answers. The Code Standards Committee reported on this that 'Straps are not specified in the Code but this method is accepted by all as being the most satisfactory and is required by many departments.'

"To the question, 'Do you allow the use of staples?' 26 said 'No' and 41 'Yes.' The committee ruled that 'The use of staples is not prohibited by the Code. Their correct use lies entirely with the workman. They must be just tight enough to secure the cable but one extra blow of the hammer which will cause the staple to dent the armor is sufficient ground to call for an entire new run of cable.'

"At the present time, in some territories, the inspection authorities require that staples be used only when guards are employed which will protect the cable from mechanical injury. That is, the use of plain staples without guards is prohibited.

"To the question 'Do you allow the use of bent nails?' 60 replied 'No' and seven 'Yes.' The committee reported 'The use of bent nails to secure armored cable in place seems to be considered as the poorest method that can be practiced. Can anyone claim that the use of nails will securely fasten a piece of cable?'

"In this territory, we, of course, prefer the two-hole strap but are also approving the one-hole device, whether it be a clip of heavy metal which goes part way around the cable or a strap of thinner metal which entirely surrounds the cable with the nail passing through each end, such as the one nail strap."

Portable Lights in Garages

How easy it seems to be to forget. We find that a number of electrical contractors are forgetting the Code requirements for the installation of attachment receptacles in garages for the connection of portable or trouble lights. This may be due, somewhat, to the convenience of using the various forms of duplex receptacles which are now on the market where the receptacles are mounted directly on covers which fit the different styles of outlet boxes. Also, some may not recognize a garage as such when it is a small affair and especially when it is in the basement of a dwelling. Rule 3301-b (1025 Code) defines as follows: "A garage shall be deemed to be a building or portion of a building in which one or more self-propelled vehicles carrying volatile, inflammable liquid for fuel or power are kept for use, sale, storage, rental, etc."

Rule 3302-b requires that the outlet and junction boxes be at least four feet above the floor and 3303-a further provides that instead of the regular type of attachment receptacle, a special type, such as a separable, two-piece or pin plug connector, be employed in which the female end be hung by means of a short piece of heavy duty flexible cord so that this connector will follow any pull to which the portable may be subjected and will, therefore, readily break apart. This connector shall, of course, be kept four feet above the floor.

Motion Picture Booth Ventilation

In the May issue of these columns mention was made of the ventilation of the motion picture machine enclosures but the discussion was in reference to the ventilation itself rather than to the electrical connections necessary to secure the ventilation. Upon investigation we find that in some sections there has been considerable laxity in complying with the Code requirements of this important matter.

Let us quote the Code on this: Rule 3503-b, in part, "Ventilation shall be provided by means of a vent pipe, etc." and 3503-c, "Draft in vent pipe shall be maintained by an exhaust fan having a capacity of at least 50 cubic feet per minute. The fan motor shall be so installed that fumes passing through the flue cannot come in contact with it, shall be connected to the emergency service and shall not be controlled from booth."

Now just read the last section again to get what we are driving at. There have been quite a few booths installed which are ventilated only by means of natural ventilation and evidently many contractors as well as inspectors have failed to realize the Code requirements of forced draft.

The Code first demands forced draft, then provides that the fan motor shall not be in the vent duct itself, further, that the motor shall be connected to the *emergency service* (required by 3902-a) and shall not be controlled from the booth. In the connection of this motor it is strongly recommended that a separate circuit be run from the *emergency* service (or meter) for this, but of course the motor may be connected to the emergency light circuit if such a

connection will not conflict with Rule 809-b 2, that is, if the total wattage of the circuit, including both lights and motor, does not exceed 1320 and the circuit is protected by a fuse of not over 15 amps. We do, however, advise against such a connection.

Then, lastly, the motor shall not be controlled from the booth. In this matter it must be remembered that a switch must be located within sight of the motor so that if the emergency light switch, or another switch at a remote point, is used, a disconnecting switch must be provided at the motor.

When Is a Building More Than a Building?

There have been numerous arguments as to services and buildings and the relations between these. Recently cases similar to the following have come up: A structure, three stories high, comprises several storerooms, each storeroom belonging to a different owner—a jointly owned stairway and hall divides the parts of the structure and a fire wall has been built between stores on the first floor but this fire wall does not extend above the second floor.

For a decision on this we turn to the definition of "building" and find "Building: A structure which stands alone or which is cut off from adjoining structures by unpierced fire walls."

Therefore, in the above case, the structure is one building and one service will be sufficient although there are several owners to the individual parts of the building.

But the next question is: Will more than one service be permitted if desired? The answer to this is not so clearly set forth. Many inspection departments claim that two or more services running into a building are not prohibited by the Code but others insist that 405-d (1925) does not allow this by a strict interpretation of "The service switch shall interrupt all conductors of the circuit and disconnect *all devices within the building.*" They ask how this can be accomplished if there are service switches at more than one point.

But the 1928 Code, cognizant of the danger that might ensue if someone opened a service switch and thought the entire wiring was disconnected from the supply and then came in contact with live wires, makes the provision that "(401-c) (1928) No building shall be supplied from the same exterior distribution system through more than one set of service conductors" except for certain special cases. Hence, after the new Code goes into effect, only one service will be allowed to a building.

Where Are Switches Required?

Quite often the question has arisen "Where does the Code require that switches be installed?"

A study of the Code reveals that there are many places in electrical installation where switches are used, but only in a few places are switches required by Code rulings. Rather the Code seems to take into consideration that an electrical installation is an engineering job and that good engineering demands switch control for facility in using electrical circuits or appliances. Who would think of installing a motor on an elevator and not providing a means for controlling it? Or who would want to install a house full of lights and pay the bill for continuous use because no provisions had been made to switch them off? Then if switches are going to be provided anyway, why waste valuable space in writing out a requirement for them except in places where they are absolutely necessary for protection of some sort.

The Code first requires (405-b-c-d and g) that a service switch be installed at the point of entrance of the service to a building. In a lighting installation this service switch would seem to be the only switch required by the Code unless the lights are in some special locations which are considered hazardous, but there has always existed an unwritten rule that keyless sockets must not be left without a switch so that the lamps have to be backed out by hand to turn them off.

1404-i covers "sockets and receptacles installed over specially inflammable material" which "shall be of the keyless type and, unless individual switches are provided, shall be located at least seven and one-half feet above the floor or shall be otherwise so located or guarded that the lamps cannot readily be backed out by hand." That is, unless a switch or switches are provided they must be left lighted at all times.

One condition which has always been troublesome arises with a group of buildings fed from one service or generating plant. This is covered by Rule 404-l and 806-f, which requires that "provision shall be made so that the service to anyone of the buildings may be disconnected. This may be accomplished by means of a disconnecting switch within the building served or by a feeder switch" in the building in which the feeder originates.

In Article 38 there appears to be a slight discrimination, if we may call it such. This article treats of signs and outline wiring and a sign may evidently be connected without a switch if the customer is willing to pay the bill for continuous use but (3804-f) "outline lighting shall be protected by its own cutout and controlled by its own switch."

Article 39 treats of special rules for theaters and here, of course, it is entirely safe to leave practically all switching requirements to good engineering practices; for what theater would think of leaving out the necessary controlling means? But it has been deemed wise to require (3903-d) that the emergency lights be controlled from the lobby or other convenient place in the front of the theater.

When we consider heating appliances we find that switches are not required on the smaller types but (1603-e) "each complete electrically heated appliance of more than 1320 watts total capacity shall be supplied by a separate branch circuit and shall be controlled by an indicating switch * * * ."

For motors a positive requirement is made in 1003-g that "each motor with its starting device shall be controlled by an indicating switch" which "shall be located within sight of the motor unless permission to locate them elsewhere is given by the inspection department." This does not prevent remote control but provides that in case such remote control is used that a switch will be located at the motor.

Chicago Permits Sheathed Cable

The Department of Gas and Electricity of Chicago now permits the use of non-metallic sheathed cable under rules more restrictive than the National Electrical Code, in the following:

1. Cable may be used only for circuits and circuit extensions in existing residence occupancies except where subject to mechanical injury as in new and remodeled building construction installations where other trades mechanics are employed during such construction.

2. No. 10 is the largest size permitted.

3. It may be run open in a plastered basement where it is not run parallel with a joist.

The Electragist

Official Journal of the
Association of Electragists—International
S. B. WILLIAMS
Editor

Problems of Outside Competition

Every convention has a keynote and the Electragist convention at Chicago, August 7-10, will be no exception. There has been one big problem of our branch of the industry that we have frequently tried to handle, but always rather gingerly and as diplomatically as possible, and that is the competition the contractor and dealer receives from other branches of the industry.

This year we shall take the gloves off and go at the job man fashion. A number of people have been asked to discuss some phase of this problem but before they were placed on the program they first agreed to do no pussy-footing.

Either the contractor and dealer have a place in the selling end or they have not. It is time we found out. If they have a place, what is that place and what can be expected of the other branches of the industry? Are they to get fair treatment from the others, or is it to be a battle to the finish of the contractor and dealer?

Every contractor and dealer who possibly can should be at the Electragist convention in Chicago in August. Their attendance will be an indication of their interest in their own predicament.

John C. Hatzel

Another pioneer has passed on, John C. Hatzel, president of Hatzel & Buehler, Inc., of New York, and charter member of the Association of Electragists.

Each time a successful contractor who has been in business a number of years passes on, we find ourselves analyzing the reasons for that man's success. The whole electrical industry has said that there is no opportunity in the electrical contracting business. Well, we have known better because we have seen men succeed in this business. Mr. Hatzel was one of those who succeeded.

As we analyze these successes, we find a thread running through each—the insistence on doing each job to the best of his ability and everlasting vigilance in the matter of efficient and economical management.

If only those who have come in the business more recently could be guided by those who have successfully weathered competition all these years no one would doubt the opportunities in the business.

Millions for Propaganda

The Federal Trade Commission is daily unearthing the expenditure of huge sums spent by the power companies to guide public opinion and create good public relations. Millions are being spent for propaganda.

We can't help wondering what the results might have been had the power companies devoted but a quarter of their propaganda budget to creating a public desire for increased electric service.

Public good will is excellent, but see how fickle it is when the public learns of the vast sums that have been spent to cultivate it. Would not the same but more firmly established result have been accomplished had the power companies created a greater desire for electric service? In other words, wouldn't good public relations have naturally followed in the wake of a constructive market development program?

Furthermore, would not an intelligent expenditure of money to create a larger market have built a strong, friendly relation within the industry? Have the contractors, or jobbers, or manufacturers gone to bat for the power companies before the Federal Trade Commission? On the other hand, had the power companies appropriated a real sum of money to be used for creation of a greater public demand for service would not the rest of the industry have stood shoulder to shoulder with them in the fighting of their battles?

In other words, if instead of setting up hurdles for the contractor, dealer, jobber and manufacturer to clear, the central stations had done their part in market development they would now find themselves with friends instead of having everybody against them.

There is a big electrical market development program to be undertaken. The greatest, most enduring benefits go to the power companies. If they would only use the money they are now spending to tell the public how good they are to create a greater public demand, they would not have to worry about securing increased load.

When a fellow keeps on telling how good he is his friends begin to believe before long that it is just talk and rather boresome talk at that. Let a fellow be up and doing and friends flock to him.

The electric light and power companies do not enjoy the good will of the other branches of the industry because they have spent millions for propaganda and almost noth-

ing for market development. Let them change their policy and do their rightful share and the electrical industry all down the line will again come into its own.

The New Code

In a few weeks the new 1928 National Electrical Code will probably be ready for distribution. All of the changes have been carefully studied by THE ELECTRAGIST and the analysis of them is now appearing in these pages. In this way we hope to make it possible for administrators and users of the Code to quickly digest the changes and put them into practice.

From some field studies we have recently been making, we are of the opinion that wiremen and contractors are not generally as familiar with the Code as they should be, and that their unfamiliarity is responsible for far too many violations that represent a waste.

In a number of communities this waste is being cut down by organized contact between the inspection and installation forces. From our experience we are of the opinion that almost every inspection department would welcome discussing and elucidating the Code to contractors and wiremen at regular intervals. We believe that the wiremen would welcome an opportunity to become familiar with the Code.

One of the most productive activities that any local contractors' association could engage in would be the setting apart of one or more nights each month for an open discussion of the Code with representatives of the local inspection department. The wiremen should be invited to these meetings. A further refinement of this suggestion, which should pay big dividends in savings, would be the setting up of a Code school for wiremen and others who might be eligible to attend and conducted by members of the inspection department. Where tried, these plans have worked out well and beneficially.

Suckers

We feel sorry every time we hear of a sucker getting fleeced but we have to admit that he had it coming to him. Of late we have been hearing of an increasing number of electrical contractors who have been fleeced good and plenty by that old past master in the art of shaking them down—the general contractor.

We have no sympathy for the electrical contractor who falls for that game. He not only loses himself but he destroys what might have been a profitable business for another.

The general contractor out after a job has no work. He uses the lowest bid in preparing his estimate. Then he cuts off a percentage before submitting his bid because he knows there are enough suckers willing to beat the low man's bid quite substantially.

Some general contractors are, of course, on the level, but far too many of them are quite willing to play the part of the vampire. Every city has its notorious bid peddlers. Why are they permitted to continue?

Why aren't they taught a lesson?

Recently we heard of a job where a general contractor, as was his habit, began bid peddling. It was such a raw case that the electrical men all withdrew and resubmitted bids at a 10 per cent increase. It was very effective.

In yet another city the electrical contractors have agreed to submit prices only to those who had work to give out. That should be effective if the contractors can only stand together.

In some cities efforts are being made to take the electrical work out of the general contract.

These are all good and effective when the electrical men stand together. A tremendous amount of money can be saved for the electrical contractors if they will only get together and refuse to be bamboozled by the general contractor.

In a city where the electrical work means $500,000 a year—and that isn't a very large city—from 10 to 20 per cent can be saved by strong group action. A local association of competitors doing this class of work could afford to hire a real strong man to keep themselves, as well as the general contractor, in line.

Right now the electrical men in such a city are wasting more than $50,000 a year and getting nothing for it. Why not spend part of that money in a strong association and save the rest?

Or had the electrical contractor rather be a sucker and continue to pay tribute to the general contractor?

Limit of Lien-Liability

There seems to be a misunderstanding on the part of some electrical contractors as to the principle of a lien law or at least as to certain of its characteristics.

Now, anybody selling anything is entitled to receive his money for the article or get the article back. In erecting a building labor and materials are used but their value is virtually nothing except as part of the completed structure. In other words, there is almost no replevin value.

Therefore, a contractor may protect himself by placing a lien on a building he has been working on. There is a limit, however, to what he may lien the building for. If he took the work on contract and he found that his costs had exceeded his bid, he may not sue for more than his bid price unless he can show that extra work was ordered. While it is true that he may have spent more for material and labor than his contract called for and that material and labor is a part of the building, the owner cannot be held responsible for the contractor's mistakes.

If this were not the case, every contractor who took a job below cost and found himself stuck would file a lien on the building to cover his full cost and a contract price would be meaningless.

A contract is a contract and the limit to which an owner is liable, provided no extra work has been ordered and performed, is the contract price.

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Oakland (C)	Laurence R. Chilcote	Hobart & Webster Sts.
Pasadena (C)	M. G. Barnes	1359 North Lake Ave.
Sacramento	L. W. Sherman	910 Ninth St.
San Francisco (C)	E. E. Browne	522 Call Building
Santa Ana (C)	O. N. Robertson	303 N. Main St.
Santa Barbara (C)	J. H. Gotchel	635 E. Haley St.
Tulare (C)	E. H. La Marsna	147 E. Kern St.
COLORADO		
Denver (C)	E. C. Headrick	89 Broadway
Pueblo (C)	E. F. Stone	So. Colorado Power Co.
CONNECTICUT		
Bridgeport (C)	L. E. Finch	529 Newfield Bldg.
Hartford (C)	A. A. Angello	473 Park St.
Waterbury (C)	D. B. Neth	107 West Main St.
DIST. OF COLUMBIA		
Washington (L)	Norman H. Barnes	Potomac Elec. Power Co.
Washington (C)	Leo Cleary	2119 Eye St., N. W.
FLORIDA		
Bradentown (C)	W. S. Stewart	W. & S. Elec. Co.
Deland (C)	C. W. Allcorn	132 No. Florida St.
Fort Myers (C)	P. K. Weatherly	Thompson-Weatherly Co.
Indian Riv. Dist. (C)	I. A. Paige	Vero Beach
Jacksonville (C)	W. H. Secrest	108 West Bay St.
Miami (C)	Daniel J. Abbott	3402 N. Miami Ave.
Orlando (C)	Solon M. Lantz	833 E. Concord
Palm Beach (C)	C. R. Carman	----------
St. Petersburg (C)	Gardiner Blackman	----------
Tampa (C)	P. F. Lyons	P. O. Box 992
GEORGIA		
Atlanta (C)	L. H Palmer	557 Marietta St.
Savannah (L)	Sylvan M. Byck	Byck Electric Co.
ILLINOIS		
Chicago:		
Electrical Contractors' Association	J. W. Collins	230 No. LaSalle St.
Master Elec. Contractors' Association	F. J. Boyle	304 S. Halsted So.
Decatur (C)	Earl Weatherford	114 East William St.
Granite City (C)	Paul S. Pender	1916 Edison Ave.
Peoria (C)	L. B. Van Nuys	238 So. Jefferson Ave.
Rockford (C)	Donald Johnson	106 North Second St.
Springfield (C)	A. D. Birnbaum	916 West Cook St.
Wheaton (C)	E. C. Krage	133 West Front St.
INDIANA		
Lake County (C)	A. R. Irwin	3461 Michigan Ave., Indiana Harbor
Indianapolis (L)	A. W. Kruge	2405 E. Tenth St.
Michigan City (C)	Walter A. Sassodeck	913 Franklin St.
Muncie (C)	Harry McCullough	113 W. Howard St.
South Bend (C	R. A. Frink	1338 Howard St.
IOWA		
Cedar Rapids (C)	H. E. Neff	94 First Ave., West
Davenport (C)	Louis F. Cory	510 Brady St.
Davenport (L)	H. Heysinger	Davenport Cont. Co.
Des Moines (C)	Floyd J. Moeckly	308 S & L Bldg.
Fort Dodge (C)	J. A. Paul	16 So. Twelfth St.
Sioux City (C)	E. A. Arzt	211 Fifth St.
Waterloo (C)	R. A. Cole	Cole Bros. Elec. Co.
KANSAS		
Salina (C)	C. G. Loomis	814 Cedar St.
Wichita (C)	P. W. Agrelius	Wichita
Wichita (C)	Oscar De Bruce	118 E. Second St.
KENTUCKY		
Lexington (C)	J. H. Brock	235 East Main St.
Louisville (C)	F. Sherman Voght	Kenyon Bldg.
Paducah (L)	K. H. Knapp	c|o Paducah Electric Co.
LOUISIANA		
New Orleans (C)	I. G. Marks	626½ Carondelet St.
Shreveport (C)	R. L. Norton	620 Marshall St.
MARYLAND		
Baltimore (C)	A. P. Peterson	515 Cathedral St.
Baltimore (C)	F. C. Claggett	Park Heights Ave.
Baltimore (C)	Geo. Robertson	Park Bank
Baltimore	W. D. Young	Calvert & Franklin Sts.
MASSACHUSETTS		
Boston (L)	Edward G. Jay	164 Federal St.
Boston (C)	Charles A. Rounds	----------
Cambridge (C)	John L. Winn, Jr.	550 Massachusetts Ave.
Lowell (C)	George A. Ryan	79 Middle St.
Haverhill (C)	H. W. Porter	14 West St.
Malden (Medford, Everett and Melrose) (C)	H. J. Walton	c|o Malden Electric Co.
Springfield (C)	C. S. Foster	220 Dwight St.
Worcester (L)	E. B. Coghlin	280 Main St.
MICHIGAN		
Detroit (C)	N. J. Biddle	112 Madison Ave.
Grand Rapids (C)	T. J. Haven	1118 Wealthy St., S. E.
Kalamazoo	E. R. Hummel	1121 Seminary St.
Muskegon (C)	Wm. Steiner	1138 3rd Street
Saginaw (C)	E. T. Eastman	209 Brewers Arcade
MINNESOTA		
Duluth (L)	Morris Braden	c|o Minn. Pow'r & Lt. Co.
Minneapolis (C)	W. I. Gray	209 Globe Building
MISSOURI		
Kansas City (C)	Walter C. DeBold	City Bank Bldg.
St. Louis:		
Electragists' Ass'n (C)	Carl H. Christine	1042 Telephone Bldg.
Electric Employers' Association (C)	A. W. Van Nort	Railway Exchange Bldg.
NEBRASKA		
Lincoln	J. E. Shuff	1400 "O" St.
Omaha (C)	E. H. Brown	1818½ Harney Street
NEW JERSEY		
Jersey City (C)	John Nairn	38 Oakland Ave
Long Branch (C) (Asbury Park and Red Bank)	Austin Hurley	Campbell Ave., Long Branch
Newark (C)	C. N. Taylor	144 New St.
Paterson (C)	H. L. Jaycox	188 Ellison St.
Philipsburg (See Lehigh Valley, Pa.)		
Prospect Park (C)	Leonard De Block	Hopper St.
Union City (C)	Frank Zeller	328 48th Street
NEW YORK		
Buffalo (L)	Samuel S. Vineberg	307 Electric Bldg.
Jamestown (C)	Henry M. Lund	309 Main Street
Nassau-Suffolk (C)	Henry T. Hobby	55 Front Street, Rockville Centre, L. I.
New York City:		
Section No. 1 (C)	Walter Knapp	207 East 43rd Street
Independent (C)	John J. Bauer	100 East 45th St.
Metropolitan (C)	George W. Neil	96 Beekman St.
Niagara Falls (C)	E. M. King	515 Niagara Street
Rochester (C)	G. Fred Laube	Laube Electric Co.
Rochester (L)	Henry F. Burton	89 East Ave.
Schenectady (C)	Richard Spengler	421 McClellan Street
Syracuse (C)	Fred P. Edinger	802 East Water St.
Utica (C)	W. C. Ballda	228 Genesee Street
Westchester Co. (C)	Jack Lalley	14 Mnr. Hse. Sq., Yonkers
Yonkers (C)	Louis Mayer	485 South Broadway
OHIO		
Akron (C)	E. C. Rishel	540 East Avenue
Canton (C)	H. S. Hastings	301 New Vickery Bldg.
Cincinnati (C)	J. F. Riehle	1642 Cedar Ave.
Cleveland (C)	F. T. Manahan	Chester Twelfth Bldg.
Columbus (L)	O. A. Robins	1242 Oak Street
Dayton (C)	Clarence Carey	1107 South Brown St.
Lorain (C)	A. B. Walton	3150 E. Erie Ave.
Toledo (C)	Fred C. Dunn	Builders' Exchange
Northern Ohio (C)	R. A. Wentz	Elyria
OKLAHOMA		
Pawhuska	C. G. Sego	Pawhuska
OREGON		
Portland (C)	J. R. Tomlinson	51 Union Ave., N.
Portland (C)	C. K. Mowrey	120 Grand Ave.
PENNSYLVANIA		
Altoona (C)	Walter Bracken	Leechburg
Allegheny Valley	E. G. Jackson	12 West Third Street
Allentown (C)	E. W. Weaver	805 Chew St.
Easton (L)	H. Clark Kreider	Arcade Bldg., Center Sq.
Erie (C)	R. D. Goff	11th and French Sts.
Philadelphia (C)	M. G. Sellers	1202 Locust Street
Pittsburgh (C)	D. A. Fleming	518 Empire Bldg.
Wilkes-Barre (L)	Leon N. Sell	Town Hall
RHODE ISLAND		
Providence (C)	H. E. Batman	36 Exchange Place
SOUTH CAROLINA		
Charleston (L)	J. P. Connolly	141 Meeting Street
SOUTH DAKOTA		
Sioux Falls	H. W. Claus	326 S. Phillips Ave.
TENNESSEE		
Chattanooga (L)	P. W. Curtis	725 Walnut Street
Knoxville (L)	Jerry G. Cason	303 West Church St.
Memphis (L)	J. J. Brennan	179 Madison Ave.
Nashville (C)	J. T. Shannon	c|o Electric Equip. Co.
Nashville (L)	F. H. Tathwell	Nashville Ry. & Lt. Co.
TEXAS		
Beaumont (C)	J. A. Solleder	Houston & Bolivar Sts.
Dallas (C)	P. B. Seastrunk	2032 Commerce St.
Houston (C)	J. A. Kibbler	----------
UTAH		
Ogden	B. Kristofferson	2249 Washington Ave.
Salt Lake City (C)	R. E. Folland	Newhouse Hotel
VIRGINIA		
Norfolk (L)	A. W. Cornick	200 Plum St.
Richmond (C)	E. M. Andrews	15 N. Twelfth Street
WASHINGTON		
Seattle (L)	P. L. Hoadley	Seaboard Building
Spokane (C)	William Stack	W. 1121 Cleveland St.
WEST VIRGINIA		
Wheeling	Peter J. Erb	1414 Eoff Street
WISCONSIN		
Green Bay (C)	V. E. Grebel	531 S. Broadway
Madison (C)	Carl J. Marsh	710 Beaver Bldg.
Milwaukee (C)	E. H. Herzberg	1604 Wells St.
Milwaukee (L)	J. S. Bartlett	443 Commerce Bldg.
Racine (C)	Joseph J. Small	1910 Linden Ave.
CANADA		
Montreal (C)	George C. L. Brassart	674 Girouard Ave.
Toronto (C)	J. A. McKay	302 Excelsior Life Bldg.
Vancouver (C)	J. C. Reston	579 Howe St.
Vancouver	J. Galloway	744 Hastings St. W.
Winnipeg (C)	Fred Ball	300 Princess St.
Winnipeg	D. O'Toole	Northern Elec. Co.

(C) designates exclusively Contractor-Dealer organization.
(L) designates an Electrical League.

JUNE ACTIVITIES

Exceptional Program Arranged for Electragist Convention

Intra-Industry Relations to be Discussed by Speakers from all Branches of the Electrical Industry—Many Entertainment Features Planned

A PRACTICAL and helpful program of addresses by famous speakers from all branches of the electrical industry; business sessions to discuss future policies of the Association of Electragists, International; a large exhibit of electrical materials; and an extensive entertainment program, are planned for the annual convention of the A. E. I. in Chicago, Ill., August 6 to 10.

Among the important matters to be acted upon in the business sessions are proposed changes in the constitution and by-laws of the Association of Electragists, International. There will also be discussions on the Electragists' and Architects' filing system for manufacturers' catalogs, a subject which has been studied by committees; a discussion and vote on merchandising and wiring policies; a report of the Electragist Standards Committee which has been preparing tentative wiring standards for electrical construction; and a report on the condition of the motor industry by national motor section of A. E. I.

Manufacturers' Exhibit

One of the largest exhibits ever held of electrical materials, wiring devices and other items used by electrical contractors, will be held by electrical manufacturers. Because of the huge size of the grand ballroom of the Hotel Stevens, the exhibits will be held in the same room as the convention sessions, making a convenient and unified session.

An attractive program of entertainment features includes: Luncheon under the auspices of the Electric Association of Chicago; card party and dancing in the grand ball room of the Hotel Stevens; general assembly and entertainment program; annual electragists' banquet and cabaret.

Speakers who will address the con-

PROGRAM

Monday, August 6

Registration: The Stevens Hotel Convention Headquarters.
All Day: Westward Ho Golf Club, Electragists' Golf Tournament (Transportation arranged from The Stevens)
Evening: Executive Committee session

Tuesday, August 7

Morning: Registration at Headquarters
Opening of Manufacturers' Exhibition Grand Ball Room, The Stevens.
Executive Committee Session
Noon: The Stevens Hotel, The Electric Association of Chicago, Regular Quarterly Luncheon, Guest Speaker: An Electragist) (All Convention Delegates Are Invited to Attend This Luncheon).
Afternoon: Business Session for Contractors and Contractor-Dealers; Appointment of Committees; Action Upon Proposed Changes in A. E. I. Constitution and By-Laws; Report Upon Electragists' and Architects' Filing System for Manufacturers' Catalogs, G. P. Fuerst, Cleveland, Chairman, A. E. I. Committee; A. B. Zerby, East Pittsburgh, Chairman N. E. M. A. Committee.
Address: "Wasted Profits," S. B. Williams, Editor THE ELECTRAGIST, New York,
Evening: Grand Ball Room, The Stevens, Card Party and Dancing.

Wednesday, August 8

Morning: Grand Ball Room, The Stevens, General Convention Session.
President's Message: Clyde L. Chamblin, San Francisco.
Address: "Are Public Utility Merchandising Methods Fair?" Philip Cabot, Economist; Graduate School of Business Administration, Harvard University.
Address: "Manufacturers' Plans for Appliance Distribution Studies," Merrill C. Morrow, Vice President Appliance Division, National Electrical Manufacturers' Association.
Address: "Some Thoughts on Motor Distribution," E. O. Shreve, Manager Industrial Department, General Electric Company, Schenectady.
Address: "The New Cooperation," L. K. Comstock, President L. K. Comstock & Company, Inc., New York, A. E. I. National Councillor to the U. S. Chamber of Commerce, Chairman of Arbitration Committee, Building Congress, of New York, Vice President Merchants' Association of N. Y. and Delegate to the International Chamber of Commerce.
Afternoon: Business Session for Contractors and Contractor-Dealers; Discussion and Action Upon Merchandising and Wiring Policies; Report of Electragist Standards Committee, A. Penn Denton, Chairman, Kansas City; A. L. Abbott, Technical Director, Association of Electragists.
Labor Sections Meetings: Union Shop Section, L. K. Comstock, Acting Chairman; Open Shop Section, S. J. Stewart, Chairman.
Evening: Grand Ball Room, The Stevens, General Assembly.
Introduction: President Clyde L. Chamblin.
Address: "A Mid-Summer Night's Dream," John F. Gilchrist, Vice President Commonwealth Edison Company, Chicago.
Entertainment: Harmony Cup Singing Contest (Cup Won for Two Years by Lake County Electragists). Cabaret, Dancing.

Thursday, August 9

Morning: Grand Ball Room, The Stevens, General Convention Session.
Address: "The Present Trend of the National Electrical Code," Victor H. Tousley, Electrical Field Engineer, National Fire Protection Association.
Address: "Credit and Credit Policies," Frederick P. Vose, Secretary National Electrical Credit Association, Chicago.
Address: "Boston Edison - Contractor Dealer Partnership," J. J. Caddigan, Superintendent Relations With Allied Interests Department, Edison Electric Illuminating Company, Boston.
Afternoon: Recreation.
Evening: Grand Ball Room, the Stevens, Annual Electragists' Banquet, Entertainment.

Friday, August 10

Morning: Grand Ball Room, The Stevens, General Convention Session.
Address: "State Enabling Acts and Licensing," H. B. Kirkland, Supervisor of Wiring Development, Society for Electrical Development, New York.
National Motor Section, A. E. I., Reports and Appointments.
Award of 1928 "James H. McGraw, Contractor-Dealer Medal."
Reports of Special Committees.
Report of Resolutions Committee.
Adjournment.
Afternoon: Executive Committee Session.

vention are: S. B. Williams, editor THE ELECTRAGIST; Clyde L. Chamblin, president Association of Electragists, International; Philip Cabot, economist; Merrill C. Morrow, vice president, appliance section, National Electrical Manufacturers' Association; E. O. Shreve, manager industrial department, General Electric Company; L. K. Comstock, president L. K. Comstock and Company; John F. Gilchrist, vice president Commonwealth Edison Company; Victor H. Tousley, electrical field engineer National Fire Protection Association; Frederick P. Vose, secretary National Electrical Credit Association; J. J. Caddigan, superintendent relations with allied interests department, Edison Electric Illuminating Company.

New A. E. I. Executive

Announcement has been made by Laurence W. Davis, general manager, Association of Electragists, International, that Hobart W. Barnes of Los Angeles, Cal., will be added to the staff of the association headquarters as assistant to the general manager.

Mr. Barnes has resigned his position as assistant secretary of the California Electragists, Southern Division, to take up his new duties on July 9.

After being graduated from college, Mr. Barnes entered the electrical contracting business with his brother in California. Later he became associated with C. J. Geisbush, executive secretary, California Electragists, Southern Division, and served in various positions as field man and assistant secretary.

Women's Program at A. E. I. Convention

A full and attractive entertainment program is scheduled for women who attend the convention of the Association of Electragists in Chicago, August 6-10. The women's entertainment committee, of which Alva Larson is chairman, has planned the following events.

Monday: Golf and luncheon at the Westward Ho Country Club; tour of the Stevens Hotel kitchens; luncheon and theatre party.

Tuesday: Informal breakfast and style show; shopping tour; visit at the Art Institute; card party and dancing in the grand ball room of the Stevens.

Wednesday: Automobile tour of the north shore; swimming and tennis; card party; general assembly with singing and dancing at the Stevens.

Thursday: Sightseeing tour; splash party at the Illinois Women's Athletic Club; annual electragists' banquet with special entertainment features.

Retiring President Honored

The New Orleans chapter of A. E. I. held a banquet on June 11 in honor of the retiring president, Monte Hart. Nearly fifty electragists were present.

Iowa Electragists Hold Convention

THE Iowa Association of Electragists held its semi-annual convention at Cedar Rapids on May 21 and 22. Until the middle of the afternoon on the first day, Monday, the convention was conducted as a joint meeting of representatives of central stations, manufacturers, jobbers, and contractor-dealers. From that time on, the contractor-dealers only took part.

Weaver L. Fowler, convention chairman, called the meeting to order on Monday morning at 9 o'clock. The address of welcome was given by Sutherland Dows, vice president and general manager, Iowa Railway and Light Company, and responded to by Earl N. Peak, president of the Iowa Association of Electragists.

Then followed the cooperative program, with talks by Mr. Peak for the contractors, John Terry, president Terry-Durin Company, for the jobbers and C. S. Macy, for the central stations. Following this was an address, "Electrical Merchandising from Trade Policy Standpoint," by C. A. Nash, general sales manager, United Light & Power Engineering & Construction Company, Davenport.

The afternoon session was opened with an address by Rex Fowler of Des Moines, "Suggestions for a Co-operative Legislation Program of Iowa." Following this, John Kuhlemeyer, secretary of the Illinois Association, and representing the National Association, spoke on "Overhead and Profit." Committee reports completed the session. In the evening a banquet was held at which their were about 250 present, including representatives of manufacturers, jobbers, and central stations. An informal dance followed the banquet.

On Tuesday morning committee meetings were held to prepare resolutions to be introduced at the afternoon session. Later in the morning an interesting "Round Table" discussion was held on such topics as local conditions, merchandise sales policies, overhead and profit and legislation.

The Tuesday afternoon session was a business meeting. At this time Fort Dodge was selected as the place for the fall convention which will be held in October. Victor Thomas, Des Moines, was elected secretary-treasurer to fill a vacancy.

A surprise had been promised for Tuesday evening's entertainment. This turned out to be a trip up the Cedar River on a house boat belonging to Mr. Robertson, executive board member. A stop was made at the lodge of Mr. Hinds, an electrical contractor.

Many women attended the convention. During the business sessions they were given a bus tour of the city by the Iowa Railway and Light Co., and were guests of the local contractors' wives at a theater party.

New York Contractors Hold Convention

Oppose High Pressure Wiring Sales Plans of Central Stations

ABOUT 150 electrical contractors from all parts of New York State met in Rochester on June 11 for the annual convention of the New York Association of Electrical Contractors and Dealers, Inc., and listened to an attractive program of addresses by well-known electrical men.

Kenneth A. McIntyre spoke on the subject of "The Industry Setting Its House in Order." Joseph C. Forsyth, speaking on electrical inspection problems, discussed the new 1928 Code and pointed out in what direction the Code was drifting. John A. Campbell spoke on "The Contractor As the Editor Sees Him," and Laurence W. Davis, general manager of the Association of Electragists, Int., discussed the subject of competition and "Courage of Salesmanship."

Frank A. Pattison, speaking on the subject, "Accuracy," said he advocated "making careful and detailed estimates and basing your handling of competition on these accurate estimates and not on a haphazard guess of what the other fellow is going to do. It matters not what the other fellow does, you cannot go outside the limits of accurate estimates and live very long. You can manage to exist but that is far from living."

At the dinner meeting in the evening, A. Lincoln Bush, president of the association, spoke on "Playing the Game."

The following day the delegates took a boat trip on Lake Ontario to Cobourg, Canada, holding a business session on the boat. A resolution was passed favoring the licensing of contractors, not under a state law but under local ordinances, and a committee was appointed to assist local organizations in the preparation and passing of such ordinances.

Resolutions

A resolution was passed stating that since electrical contractors have invested capital and are concerned with profitable rewiring, the New York State Association of Electrical Contractor-Dealers records itself as follows:

"1. That we disapprove of such sales plans or campaigns proposed by central stations which disregard the normal business costs and functions of the established contractor-dealers, and

A. L. Bush and L. R. Rogers

which substitute temporary high-pressure sales methods at prices and terms disturbing to normal business development, with the employment of power company salesmen on commission basis and the awarding of wiring contracts only to those contractors who have the least investment in the business.

"2. That we encourage the cooperative development with the central stations and the rest of the industry of rewiring programs in which there shall be an adequate incentive and reward for all interests and a permanent stimulus to sales efforts and education of the public, and utilizing the normal established contractor-dealer channels.

"3. That we pledge the support of our Association and the cooperation of our members to such constructive programs for market development."

It was voted to hold the next semi-annual meeting in New York City in January, 1929.

A. Lincoln Bush, New York, formerly president, was elected chairman of the board of directors; L. R. Rogers, Schenectady, was chosen president; Louis Freund, New York, vice president; James F. Burns, Schenectady, treasurer; Herbert F. Janick, Rochester, secretary; S. J. O'Brien, New York, L. W. Kiesewetter, Syracuse, and G. F. Laube, Rochester, directors.

Jobbers Become Wholesalers

The Electrical Supply Jobbers' Association became the National Electrical Wholesalers' Association by vote of the members at the annual meeting at Hot Springs, June 6, 1928. Among the important recommendations were two on conduit and wire conductors, prepared by the merchandise committee and approved by the convention:

"(a) Recommended to manufacturers that all coils be wire tied, and tags giving the number of feet in the coil inserted thereon.

"(b) Recommended to the manufacturers of couplings and elbows that couplings up to and including one inch be packed in bags of fifty; one and one-fourth inch and one and one-half inch, 25 to the bag; and that elbows one-half inch to one inch inclusive, be packed 25 to the bag."

Wiring Research

The Electrical Industry Sales Conference has engaged the J. Walter Thompson Company as market counsel to undertake immediately a research study of the market for adequate wiring in the home.

The problem of increasing the effectiveness of the house wiring contractor is being considered as the subject of a special program for industry action and is not within the scope of the work assigned to the agency, although the house wiring contractor will be one of the elements to be considered in the development of the main selling plan.

The scope of the work for which the agency has been engaged is stated as follows:

1. "Approaching the problem with the attitude of fundamental analysis, the necessary investigation is to be made which will provide a clear understanding of the market to be influenced, geographically and psychologically, with regard to this problem, as a basis of definite knowledge on which to proceed. This investigation will refer to the present objectives of the conference, as distinguished from a broader investigation of the whole marketing situation of the industry.

2. "Interpret the findings of this investigation in the light of broad merchandising experience and with an outside viewpoint.

3. "Prepare a comprehensive all-industry selling program founded on the conclusions reached, and comprised of two parts, viz.:

a. "A complete and self contained localized selling plan, suited to successful promotion and operation in any community. This would be designed as a local co-operative plan, with participation by the electric utility, jobber, contractor, dealer and manufacturers' local representatives.

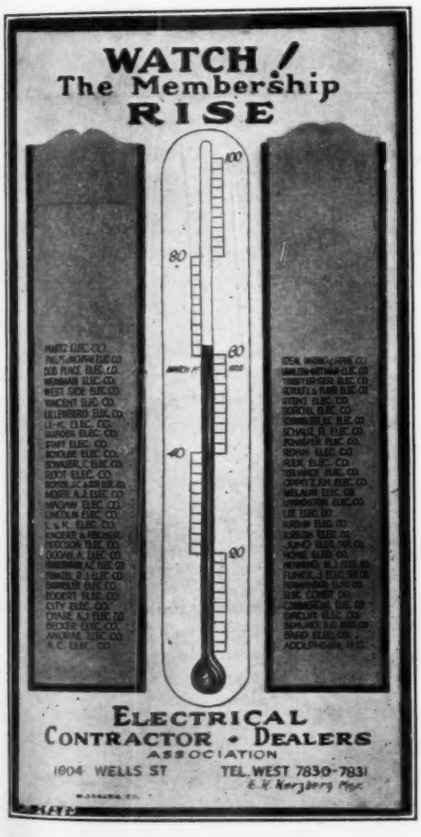
b. "A national phase to give a national background of advertising and publicity, and to provide the bond for tying the local programs into a national movement.

"It is expected that the program will be built around a new and effective approach that will grip public imagination.

4. "Develop an effective plan for presenting the main selling program to the electrical industry in a way to secure the necessary financial support and participation throughout the country. The industry's existing national and local facilities would, of course, be counted on to perform their proper functions."

Thermometer Records Membership Progress

The Electrical Contractor Dealers' Association of Milwaukee, Wisc., has established a unique method of recording and stimulating increases in membership. A thermometer lists the members of the association individually and shows the growth in total membership. It is prominently displayed in the stores of wholesalers.



League Condemns N. E. L. A. Wiring Policy

Long Island Body Asserts Wiring Committee Attacks Public Confidence in Contractors

At their annual meeting on June 13, the Nassau-Suffolk Electric League of Long Island, N. Y., passed a resolution condemning the policy of the wiring committee of the N. E. L. A. in advocating the inauguration by central stations of a re-wiring campaign at prices below the normal costs of doing business. The resolution reads:

Whereas, We, the electrical contractors and dealers of Nassau and Suffolk counties, New York, who have established and maintain places of business for the conduct of electrical contracting and merchandising; and

Whereas, We have invested capital and labor in these enterprises for the service of the public; and

Whereas, We have from time to time felt the pressure of the unfair competition of the central station companies' merchandising policies, i. e., premiums, cut rates and extra long term contracts and high pressure salesmanship; and

Whereas, We are apprised by the Association of Electragists that the wiring committee of the National Electric Light Association in a report recently issued, attacks the public's confidence in the responsibility, workmanship and prices of the electrical contractors and advocates the central stations inaugurating re-wiring campaigns at prices below the normal costs of the electrical contracting business; and

Whereas, We believe that such a policy if established, would spell ruin for many of our members, it is hereby

Resolved: That we, the Nassau-Suffolk Electric League, in this, our annual meeting, declare ourselves unalterably opposed to this policy and instruct the secretary to transmit a copy of this resolution to the Association of Electragists, International, to use at their discretion in combatting this issue.

N. E. L. A. Convention Held

At the fifty-first convention of the National Electric Light Association, the following officers were elected: President, P. S. Arkwright, Georgia Power Company, Atlanta, Ga.; first vice president, M. S. Sloan, Brooklyn Edison Company, Inc., Brooklyn, N. Y.; second vice president, W. A. Jones, Henry L. Doherty & Co., New York, N. Y.; third vice president, J. F. Owens, Oklahoma Gas & Electric Company, Oklahoma City, Okla.; fourth vice president, A. W. Thompson, the United Gas Improvement Co., Philadelphia, Pa.; managing director, Paul S. Clapp, National Electric Light Assoc., New York, N. Y.; secretary, A. Jackson Marshall, National Electric Light Association, New York, N. Y.

A. L. E. A. Holds Convention

The annual convention of the Artistic Lighting Equipment Association was held in Chicago on June 11 to 16. At the opening meeting, an address was given by William R. Dawes, president of the Chicago Association of Commerce, followed by a welcome to delegates by George J. Klein, president of A. L. E. A. At a dinner meeting in the evening, an address was given by Professor H. H. Higbee, University of Michigan, and past national president of the Illuminating Engineering Society. At the general session of the second day, Homer J. Buckley, president Buckley, Dement & Co., gave an address on "Meeting the Problem of Lower Selling Costs." The national lighting equipment exhibition was held during the convention.

Summarizes Electric Heating

ELECTRIC HEATING *By Edgar A. Wilcox, Con. Eng.* (McGraw Hill Book Co.)

This book presents a clear perspective of the entire field of electrical heating. After covering the fundamentals of heat, electricity, and the design of heating units, it continues with the treatment of cooking, water and air heating, ovens, furnaces, welding, metal heaters, sterilizers, stills, steam boilers, liquid heaters, compound melting pots, incubators and brooders. It ends with chapters on metal coating, methods and means of temperature measurement and control and one summarizing thermal insulation values of an unusually complete list of materials.

The book assembles many tables applying to the subject which usually must be searched for among a number of sources and presents them in electrical terms. This is of great help to the electrical man, eliminating the uncertainty which attends the use of unfamiliar units and conversion factors. Calculations are clearly developed, so that they are readily understood. With each application of electric heat, the attendant advantages are given.

Changes in Staff of S. E. D.

There have been several changes in the staff of the Society for Electrical Development. O. C. Small, formerly assistant to the managing director, is now director of the league and field department. The monthly advertising service, formerly supervised by Mr. Small, becomes part of the publicity department's work. The Red Seal department has been replaced by the wiring promotion department, with B. Batrian as head. The uniform ordinance department has been formed with Harry B. Kirkland as director. The newly created research and planning department is managed by George Jaquet, assisted by E. S. Baker. E. A. Beer is field representative of the league and field department.

OBITUARY

J. C. Hatzel

J. C. Hatzel, well known electragist of New York City and president of Hatzel & Buehler, Inc., died May 25, 1928, mourned by a host of friends among electrical men of all classes. Born in New York in 1860, Mr. Hatzel's first position in the electrical industry came in 1881, when he joined the Edison Electric Illuminating Company of New

J. C. Hatzel

York. Later he founded the partnership of Hatzel & Buehler, with Joseph Buehler, which in 1917 was incorporated.

Mr. Hatzel was one of the pioneer members of the predecessors of the Association of Electragists, International, and was always active in association activities. He was a member of the Electrical Contractors' Association of New York City, the New York State Electrical Contractors' Association, Electrical Board of Trade, American Institute of Electrical Engineers, New York Electrical Society, Illuminating Engineering Society, American Electro-Chemical Society and the Edison Pioneers.

Contractor-Dealer Notes

The name of the Liberty Electric Shop 1115 West Washington Street, Chicago, has been changed to the Liberty Electric Construction Co., Inc.

A new "ceiling" light, used to determine the height of clouds, has been installed at Chandler Field, Atlanta, Ga., by R. C. Turner, city electrician. The new light will send a beam of 8,000,000 candle power at an angle of 45 degrees, the ceiling being estimated by geometric calculation.

R. A. Murphy, electrical contractor, member of the Electric League of Washington, assisted by John H. Potts, recently planned and installed a lighting system in the Barber Galleries of Art and Antiques, Washington, D. C. The source of light is entirely invisible, in order to prevent distortion of the color values of paintings and other art pieces on display.

P. H. Hendrick has been elected electrical inspector of Atlanta, Ga.

The Howard P. Foley Company recently announced the following changes: Bancroft T. Foley, vice president, is now located in Washington and will have charge of the southeast territory. Howard P. Foley, president, will work for the most part in New York City. Herman Wilson, of the Washington office, is temporarily in the Philadelphia office.

A new hotel, called the Irvin Cobb, is being erected in Paducah, Ky., the birthplace of the writer. The electrical work is being done by the S. D. Dalby Electrical Co., Paducah.

New Electragists

The following contractor-dealers have made application and been accepted into the A. E. I. since the publication of the last list in the June issue:

ALABAMA

Birmingham:
Bryant Elec. Co.
Commercial Elec. Co.
C. C. Crowe
D. S. Litton Elec. Co.
Fruitticher Elec. Co.

Gadsden:
Edwards Elec. Co.
Electric Constr. Co.
M. & A. Elec. Co.

Montgomery:
Southeastern Elec. & Eng. Co.

CALIFORNIA

Inglewood:
Inglewood Electric

Los Angeles:
Hamm & Smith

Oakland:
Hartman Elec. Co.

Pasadena:
W. E. Langstaff

Whittier:
K. D. Miller Electric, Inc.

Sacramento:
Reliable Elevator Works

ILLINOIS

Jacksonville:
Fred W. Jameson

MARYLAND

Baltimore:
The Garrison Elec. Co.

MASSACHUSETTS

Boston:
Charles L. Devoe Co.

MISSOURI

St. Louis:
Hornbeck & Hardie Elec. Co.
Kanter Elec. Co.

NEW YORK

Brooklyn:
G. F. Busch & Co.
Wiltse & Griffin, Inc.

Genoa:
Archibald P. Bradley

Schenectady:
Rogers and Abbe

OHIO

Youngstown:
Williams Radio Electric

OREGON

Eugene:
H. W. White Elec. Co.

Klamath Falls:
Link River Elec. Co.

Marshfield:
Marshfield Elec. Co.

Salem:
Eoff Electric, Inc.
Fleener Elec. Co.

WISCONSIN

Milwaukee:
Phelps & Wichman Electric

MEXICO

Mexico, D. F.:
Hubard & Bourlon, Sucs., S. A.